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THE ANOMALIES OF THE OCULAR MUSCLES.

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FIRST PAPER.

I.

AFFECTIONS of the ocular muscles may be divided into those which are physiological peculiarities and those which result from pathological conditions. It is proposed now to consider the first of these two groups.

In the normal adjustments of the eyes in the act of vision, two distinct classes of muscles perform each its separate office. The muscle of accommodation situated within the eyeball acting as focal adjuster for each eye, while the long muscles within the orbit direct the eyeballs in such a way as to bring the visual axes of the two eyes to bear upon the point for which the focal adjustment is made.

The two classes of muscles are in a sense independent of each other, yet in a very important sense in close and interdependent relation. In the discussion of the anomalies of the ocular muscles, then, the relation of these two classes is to be constantly regarded. The affections of the ciliary muscles, constituting the essential factor in the subject of the accommodation of the eye, become a subject of special study, and not to be considered in this connection further than in respect to the reciprocal influences of the two classes of muscles.

Such special conditions of the muscles of accommodation as may be necessary to refer to in order to obtain a proper understanding of their relations with the class of muscles more directly under consideration will be introduced as occasion demands.

The subject of anomalies of the directing muscular apparatus of the eyes divides itself again into two classes: first, those which permit of habitual binocular vision; second, those in which a blending of the images of the two eyes is so difficult as to be, in most instances, impossible. In the first of these two classes of faults, binocular vision is maintained by the expenditure of a greater amount of force than is demanded in perfect equilibrium of the ocular muscles; in the second, a psychical disturbance results which may have an important bearing upon the general physical condition of the individual subject of the anomaly. The two classes are in reality but different degrees of similar affections, and the classification depends upon the psychical presence or absence of the phenomenon of a fusion of images. Indeed, under certain circumstances, one of these conditions may pass into the other, and one who, in robust health, blends images habitually and with difficulty may, in a condition of impaired nervous energy, be quite unable to maintain a fusion of the images of the two eyes. Even the presence or absence of binocular vision, then, does not constitute an absolute and sharply defined line of classification. It also often happens that, with gross departures from the standard of equilibrium of the ocular muscles, habitual binocular vision is sometimes maintained, while in other instances comparatively moderate anomalies give rise to diplopia.

Such conditions must, however, be regarded as exceptional, and if the boundary, the sustained presence of single vision, like many of the boundaries of classification in science, is sometimes vague, it will on the whole be found practical and satisfactory.

Directing our observations first to the class of anomalies in which habitual binocular vision is maintained, we shall find a theme rich in interest and of pre-eminent importance in its practical bearing.

While it is true that some of the most illustrious names among those who have contributed to the notable progress of modern ophthalmology have been identified with the discussion of this subject, it is nevertheless also true that,

considered in respect to its importance, comparatively slight attention has been bestowed upon it in the literature devoted to ocular affections. For the most important expositions in this department of ophthalmology we are indebted to Von Graefe, who left to the world, among his richest contributions to the literature of science, extensive memoirs upon subjects connected with the ocular muscles, replete with learning and original research. Investigators from his time have been, in large measure, content to accept the results of his splendid genius as in the main conclusive, and since his death it cannot be said that any very striking advance has been made in this direction. But Graefe's observations were those of a pioneer. They were not exhaustive, indeed they were, in respect to the class of affections now under consideration, incomplete and confined mainly, it may be said almost exclusively, to a single anomaly among several, and that one, as it will be seen, not the one of greatest practical importance. In these muscular affections in which, with absence of equilibrium the ability to maintain binocular vision remains, there is a tendency on the part of the eyes to permit the visual lines to deviate from parallel directions. Graefe, with others, taught that when the ocular muscles are all accurately proportioned in respect to their dynamic conditions, and the performance of binocular vision is accompanied with the least expenditure of energy, the ocular muscles are to be regarded as in "equilibrium." The tests, however, which have been applied to the determination of the presence or absence of equilibrium have not in all cases been sufficiently trustworthy, and it is desirable in the beginning of this discussion to determine precisely what is indicated by the term equilibrium, and to establish definite means of ascertaining, by the most conclusive methods attainable, the true conditions of the muscles in this respect.

Graefe regarded the ability to direct the axes of the two eyes to the same point, at the usual distance of reading, without excessive effort, as a practical standard of equilibrium, and taught that this should be gained even at the expense of very great loss of equilibrium at greater distan-

ces.? Thus, in operating for relief of "insufficiency of the interni," he was ready to induce very high degrees of "insufficiency of the externi," or even homonymous diplopia at a distance. As Graefe's operations were in large measure designed for the relief of "insufficiency of the interni," in cases of high grades of myopia, the great disadvantages of the loss of equilibrium at a distance were less pronounced than would have been the case under other circumstances. Such a standard of equilibrium should not be accepted. Equilibrium does not exist when comparatively easy fusion of images is gained at one point at the expense of difficulty or impossibility of fusion at another.

In equilibrium, the visual lines of the two eyes should be parallel when the force of the will in accommadating or adjusting the eyes is removed—that is, when the minimum of nervous impulse is directed to the ocular muscles. Deviations from a given standard of equilibrium short of the loss of power of fusion of images have been known as "insufficiencies." The term has, however, been mostly applied to an inadequate converging power for the distance of reading or ordinary work, and it has often, even by Graefe, been employed in connection with low grades of actual strabismus.

In the conditions of absence of equilibrium now under consideration, and as they will be discussed in this paper, there is, in the act of vision, no actual turning of one visual line in a direction differing from that of the other when looking at a distant point. Indeed, in gazing directly forward at a distant object parallelism is supposed. There is, however, in these conditions, on the part of some one or more muscles, a tendency to disturb the balance; and should the nervous control be so removed as to permit of the consummation of this tendency, an actual deviation would result. Such irregular tendencies, then, may exist in as many directions as there are forces to induce irregular tension—that is, not only in as many directions as there are muscles to act, but in as many directions as the muscles may combine to act. In short, then, these tendencies may exist in all directions. Without stopping here to discuss

the question whether it is important to discover and to estimate the degree of all these deviations—a subject which will engage our attention further on,—we may here assume that all are important, and that no just appreciation of the conditions which induce asthenopic or kindred troubles can be acquired which does not take them all into account. It becomes necessary, then, to establish some method of investigating and of recording such anomalies.

So long as the increased tension upon the interni, in the act of reading, or in other continued work at a like distance, was regarded as the main, if not the only important factor in the causation of muscular fatigue, aside from accommodative lesions, the test of the dot and line, as suggested by Graefe for this condition, appeared to answer the requirements. This familiar test was made at reading distance, although Graefe counsels that, after having determined the degree of insufficiency for this distance, we should examine in the same way for greater distances. Without specifying the distances, he, in close relation to this part of the discussion, mentions his experience at abduction and adduction at a distance of six feet. This counsel, to determine the insufficiency at greater distances, judging from the literature of text-books, has been mainly disregarded, and indeed Graefe himself considered it of secondary, if not in most cases of little importance. The facts remain that in respect to this one test for a single condition there is not a well-established rule or custom. Even were complete uniformity observed in the examinations or records of this condition of the ocular muscles, this method is quite inadequate for the determination of several other conditions, and, as will be seen hereafter, extremely unreliable even for this one.

No just appreciation of the muscular balance can be arrived at while the accommodation is considerably exercised. Hence the principal determinations should be made at such distance as to render the accommodation practically relaxed, and while the determination of the inclination of the visual lines in the act of accommodation may be of importance, and may throw some light upon the false tenden-

cies, it should not be regarded as a method representing the presence of equilibrium or of the degree of deviation from it.

Elsewhere[1] I have discussed the manner in which one may discover these faulty conditions. In order that in what is to follow there may be no misunderstanding, that the conditions under which the investigation of these visual tendencies are to be made and the manner of making them may be definitely understood, I trust that I may be pardoned for restating in as brief a manner as possible what was there more fully discussed. The head being in the "primary" position and the ocular muscles relaxed, while ametropia, if existing, is corrected by appropriate glasses, the subject of examination directs the eyes at an object, preferably a lighted candle against a dark background, situated at the distance of twenty feet. Diplopia is then produced by a prism. First of all diplopia should be produced in the horizontal direction, in order to determine the relative tendencies of the visual lines in the vertical meridian. If the prism is first employed with its base up or down, and especially if it is held before the eye for some seconds, there will follow a partial adjustment of the visual axes to the new condition, and if then the prism is placed horizontally, this temporary adjustment may appear in the test which is about to be made. A very slight adjustment of this kind is of much less importance in the tests for the lateral relations. A prism sufficient to prevent fusion of images at the given distance, but not so strong as to cause a wide separation of the images, is to be placed with its base inward and exactly horizontal. If now the two images of the object looked at appear to be precisely in the same plane, no tendency of one visual line to rise above the other has been shown. If on the other hand the images appear not in the same plane, a prism should be placed before one eye with its base up or down, and of such grade as will bring the mounting line down or the depressed one up to the plane of the other. The degree of prism marks the

[1] *Archives d'Ophthalmologie* (Paris), Nov., 1886; *New York Medical Journal*, Dec. 8, 1886.

ascertained degree of tendency to deviate from the plane. For convenience in making this determination I have had made several pairs of spectacles containing, in each side, prisms of equal grade, 5°, 6°, and 7° each, with their bases in. The glasses are quite long and in the form of a parallelogram, in order that their exact position on the face may be accurately known. These spectacles are convenient in saving time and in assisting toward greater accuracy in the examination than is likely to be obtained by the use of the ordinary trial frame or from prisms held in the hand.

This test having been made with care, the prism is then placed before one eye with its base up or down. Graefe used a prism of 15°; for his tests were made at near range, but one of 7° or even less will, in ordinary cases, induce diplopia, and permit of more accurate judgment of the relative position of the images on the part of the patient. Any deviation from the vertical line is to be measured by the prism which will bring the images in line, as suggested by Graefe. By turning the first prism a certain number of degrees until the correction is made, we may also, the grade of the prism and the degree of the turning being known, estimate the degree of deviation. By these two procedures information in two very important directions is obtained; but the absence of positive evidence of anomalous tendencies, as shown by these tests, does not by any means prove the presence of equilibrium, and other means must be tried. Here the method of producing abduction and adduction is to be resorted to, not, however, at six but at twenty feet.

An experience in many thousand examinations leads me to believe that the standard of normal abduction should be about 8°, and that of adduction at about 50°. In respect to this last, however, the ability to overcome prisms equal to 50° implies, in most cases, an ability indefinitely exceeding this, and many who at the first trial can accomplish only one half of this will, after two or three attempts on different days, succeed in uniting images with the full strength of the adducting prisms. On the other hand, while the failure to overcome at twenty feet a prism of 8° with its base in

should be regarded as suggesting an excess of energy over the others on the part of the interni, and while power to overcome a higher prism suggests a balance in the opposite direction, many cases occur in which the absence of ability to overcome a prism of 5° does not prove an inward tendency of the lines, nor does the blending with a prism of 10° or 12° prove a tendency outward. The ability to overcome a very strong prism with its base inward may be associated with actual converging strabismus, and the failure to overcome a comparatively weak one may be associated with an outward balance.

These results are to be compared with those already obtained by the diplopia tests when the prism is held vertically, but especially should they be considered in regard to any tendency of the visual axes to deviate in respect to the horizontal plane, for, as it will be seen, a very slight anomaly in this respect may modify the abducting or adducting power materially. In a like manner also, the ability to overcome a prism with its base up or down should be ascertained. Graefe declared his inability to overcome a prism of more than one degree in this direction at six feet, and states that, for nearly all those whom he tried, a prism of 2° was too strong. My own experience varies from this, for I have found that a very large proportion of the persons whom I have examined can overcome 2° or 3° at twenty feet, and I should place the average ability in cases in which no false tendencies exist in this direction at about 3°. It is not very uncommon to find persons who will overcome 9° or more in this direction. But it would appear to be of slight consequence whether the adjusting ability in this direction is rather more or less than 3°, if the power in one direction is equal to that in the other. An excess of power, however, leads to the suspicion that excessive demands arising from anomalous conditions have been imposed upon the muscles. The adjusting power is, in this respect, to be proved by placing the strongest prism which can be overcome before one and then the other eye in the same manner, or by reversing the prism before the same eye; for the effort at overcoming a prism with its base

down before one eye, is identical with that for uniting with its base up before the other. If we consider the results of the examination in the horizontal direction in relation to those in the vertical, we shall be able to form an opinion concerning the presence or absence of equilibrium, and, if manifest deviating tendencies exist, of the direction and extent of such tendencies. It is not, however, to be assumed that these indications are absolute. They are, as a rule, correct so far as they are positive, but they do not of necessity permit us to determine the absolute degree of deviating tendency. Here, as in hyperopia, a latent anomalous tendency may exist but, unlike hyperopia, we have here no means of ascertaining at a single examination the absolute departure from the ideal standard. Notwithstanding no proof may have been obtained by these trials, latent tendencies of great importance may exist. Our tests determine the manifest conditions only, and it is a safe rule to consider that the deviating tendencies are never less than are shown by our trials, but that they may greatly exceed that which we are able to demonstrate.

Having determined in this manner the approximate condition of muscular adjustment when no effort of accommodation is demanded, we may proceed to a similar examination at a near point. For convenience we may adopt the distance at which the majority of people hold the page when reading. Tests made at the distance of one half metre will sufficiently indicate the tendencies when the eyes are in accommodation for near work. Here prisms of greater angle than those employed for producing diplopia at a distance will be required, but the determinations may be made in the same general manner. Presbyopic persons should be supplied with reading-glasses in making this test, and the glasses for myopes should be such as are suited for the prescribed distance.

Terms by which we may express all the deviating tendencies which may be discovered in the manner indicated have been wanting. The imperfections of the nomenclature for ocular muscular anomalies have been discussed by myself in the articles already referred to, and a system of terms has

been suggested. While, in order to avoid misunderstanding, the terms already familiar will, to a certain extent, be employed in this discussion, those which I have proposed will be used as the standard, and without apology for the innovation beyond what I have expressed in the former papers. The signification of these terms is repeated here:

"I. Generic terms. *Orthophoria* (ὀρθός, right, φόρος, a tending): a tending of the visual lines in parallelism. *Heterophoria* (ἕτερος, different): a tending of these lines in some other way.

"II. Specific terms. Heterophoria may be divided into: (1) *esophoria:* a tending of the visual lines inward; (2) *exophoria:* a tending of the lines outward; (3) *hyperphoria* (right or left): a tending of the right or left visual line in a direction above its fellow.

"This term does not imply that the line to which it is referred is too high, but that it is higher than the other, without indicating which may be at fault.

"III. Compound terms. Tendencies in oblique directions may be expressed as *hyperesophoria*, a tending upward and inward; or *hyperexophoria*, a tending upward and outward. The designation 'right' or 'left' must be applied to these terms.

"In recording the respective elements of such compound expressions I have employed the sign ⌙. For example, if it is desired to indicate that the right visual line tends above its fellow 3°, and that there is a tending inward of 4°, the facts are noted thus: Right hyperesophoria 3° ⌙ 4°."

II.

HYPERPHORIA.

By hyperphoria is meant the condition of the ocular muscles in which, with a minimum of tension, a deviation of one visual line above the other would result. Habitual binocular vision is assumed, although we shall see that it is probable that in a considerable proportion of cases in which hyperphoria of more than a single degree exists, the tendency to diplopia is so great that the subjects of the

affection often surrender to it—a fact confirmed by the marked amblyopia often found associated with this muscular condition.

Among the varieties of heterophoria none exerts a more disturbing or injurious influence than hyperphoria. It is not only a condition giving rise in itself to great fatigue and perplexity, but it complicates and exaggerates all other faulty tendencies. When we recall the fact that with a fair adducting power one may overcome prisms of 50° with the base to the temples, and that with a good abducting ability a prism of 7° or 8° is easily overcome in the opposite direction, it will be apparent that muscles which do not ordinarily overcome more than a prism of three degrees, as is the case when the prism is placed with its base up and down, must be in a condition of great disadvantage when hyperphoria of one or two degrees exists. If we were to compare the relative nervous impulse demanded by the grade of the prism, which can be overcome in the different directions, then a deviating tendency of one visual line above the other (hyperphoria) of one degree would be equal to a deviating tendency outward (exophoria, insufficiency of the interni) of more than fifteen degrees. In other words, a faulty tendency of one or two degrees in the vertical direction falls little short of a diverging strabismus in importance. That this is actually nearly the relative importance of the two conditions appears evident from several considerations which arise from conditions found associated with hyperphoria. These conditions are local and remote. The local relate directly to the function of vision, to the adjustments of the eyes in the performance of the visual function, and to nervous disturbances of a functional or trophic nature in and immediately about the eyes.

The remote conditions relate to a great variety of disturbances of a nervous character in parts more or less removed from the eyes.

Hyperphoria of a low grade, as determined by a correcting prism, is very frequently attended by amblyopia. It is no unusual occurrence to find, in a case of hyperphoria which may be measured by a prism of 1° or 2°, vision of

only $\frac{20}{40}$ or even less, while the refractive conditions are not far removed from emmetropia, and the ophthalmoscope reveals either no pathological state or only a slight tendency to the hyperæmia about the disc which is characteristic of irritability of the eyes from muscular irregularities. The relative number of cases in which such defective visual power exists will, to one who has not well considered the subject, appear to be out of proportion to the muscular defect. The surprise will, however, give place to conviction if we bring clearly to mind the actual effects from the standpoint of physiological optics, of a very slight faulty tendency in the vertical direction. An actual deviation of a single degree would result in a separation of images at a distance of one half metre, approximately of 6.4 *mm.* A patient, then, with this amount of deviating tendency, who would bring the letters of the type in which this page is printed, even in contact, the lower border of the upper image touching the upper border of the lower, would require to exert a force upon the superior and inferior muscles greater than Graefe was able to exercise. If, however, by long practice, the muscles engaged in overcoming this fault acquire unusual strength, as is actually the case, still, when the tension has been continued for a considerable time, or when the general nervous tone is diminished from fatigue or ill health, an almost irresistible tendency to diplopia will occur. The remedy for the confusion thus induced is a renewal of the inordinate muscular tension or the suppression of the image of one of the eyes. This later really takes place, and the image suppressed is liable to be that of the eye in which greatest refractive anomaly is found, if a difference exists, or if the eyes are equally well adapted for clear vision the suppression occurs alternately. Hence, with a greater refractive anomaly in one eye, amblyopia will usually be found principally in the less perfectly constructed eye, while if the eyes are nearly or quite alike, the amblyopia will exist equally in the two eyes. Exceptions to this rule exist, especially in cases where, with myopia as the ametropic condition, the myopic eye is employed at the near point, while the more perfect eye is used for distant seeing.

The extent to which amblyopia exists in connection with hyperphoria is illustrated in the following tables. One hundred consecutive cases in which there existed hyperphoria, and in which no disease or injury of the eyes was found, and in which the refractive errors were not sufficient to account for any considerable defect of vision when correcting glasses were used, are included in the tables, excluding cases of high grades of refractive errors. The highest grade of astigmatism not exceeding 3.00 D, the highest of hyperopia not exceeding 4.00 D, and the highest of myopia not exceeding 5.00 D.

TABLE I.

Refractive error.	1.00 D or less.	More than 1.00 D; not exceeding 2.50 D.	More than 2.50 D to 4.00 D.	More than 4.00 D to 5.00 D.	Total.
Emmetropia .					45
Myopia . . .	9	19	7	7	42
Hypermetropia	37	24	12		73
Astigmatism .	28	7	5		40
	74	50	24	7	200

Acuteness of vision.	Refractive error.						Total.
	1.00 D or less.		More than 1.00 D; not exceeding 2.00 D.		More than 2.50 D; not exceeding 5.00 D.		
	Best eye.	Worst eye.	Best eye.	Worst eye.	Best eye.	Worst eye.	
$\frac{20}{20}$	38	21	7	7	4	4	81
$\frac{20}{30}$	22	15	8	8	1	5	59
$\frac{20}{40}$	6	8	3	7	3	4	31
$\frac{20}{50}$	1	2	2	5	1	2	13
$\frac{20}{60}$	1	1	1	2	2	2	9
$\frac{20}{70}$		3				2	5
$\frac{20}{100}$		1				1	2
Total	68	51	21	29	11	20	200

In the first table the proportion of eyes affected with different grades of refractive errors is shown; in the second, the acuteness of vision according to the refractive condition.

The vision of the best- and worst-seeing eyes in each grade is given but for convenience, in the estimate of the comparative value of the best and worst, in all cases where vision is equal in the two eyes one is reckoned as best and the other worst. If anisometropia exists to the extent of bringing the refractive conditions of two eyes in different columns, the vision of one eye only is placed in each column.

From the above tables we obtain the following approximate results:

Average Vision of Best Eyes.

Sixty-eight with less than 1.00 D refractive error, $\frac{18}{20}$.

Twenty-one with more than 1.00 D and less than 2.50 refractive error, $\frac{13}{20}$.

Eleven with more than 2.50 D and less than 5.50 D refractive error, $\frac{13}{20}$.

General average of vision of 100 best eyes, $\frac{20}{30}$.

Average Vision of Worst Eyes.

Fifty-one with less than 1.00 D refractive error, $\frac{14}{20}$.

Twenty-nine with more than 1.00 D and less than 2.50 D refractive error, $\frac{12}{20}$.

Twenty with more than 2.50 D and less than 5.50 D refractive error, $\frac{11}{20}$.

General average of vision of 100 worst eyes, $\frac{20}{50}$.

It will be seen from the above table that defective vision is rather the rule than the exception in moderate degrees of hyperphoria. It is a fact that must have occurred to every experienced oculist, that in anisometropia a material difference in the visual power of the two eyes is exceedingly common. But it is also true that in anisometropia a difference in the form of the orbit is quite common, a fact which would tend to a failure of equilibrium in the length or strength of the motor muscles of the eyes. Experience

confirms this reasoning, and I have found that instances of even approximate balancing of the eye muscles in anisometropia is rather exceptional.

From the facts thus ascertained it becomes evident that amblyopia is not only very commonly associated with hyperphoria, but that it is not uncommonly a result of that anomalous condition.

A peculiar and interesting visual disturbance, related to yet differing from amblyopia, is the inability of the subject to see small objects clearly, although for larger objects, at the distance of some feet, the visual power is fair or even good. Thus, one may be able to read No. XXX., or even No, XX. of Snellen's scale, and may have no especial fault of accommodation, yet when No. I. is presented at the distance of one foot, the patient is quite unable to read. Small objects or characters are seen indistinctly or not at all. The fault in these cases appears to consist in an inability completely to fuse the images of the two eyes, while the separation is not sufficiently great to enable the patient to easily suppress one of them. This phenomenon is illustrated in the confusion which appears when one reads the word here doubly printed: *Accommodation* If we cover with a card the lower range of type, the word is perfectly clear. A corresponding result may be effected in a considerable degree of hyperphoria by the mental suppression of the upper or lower rank of letters. If, however, the separation is less complete, as in this instance: *Accommodation* we are quite unable to exclude either of the confusing ranks, as in the former experiment with the card, and the difficulty of a mental exclusion on the part of the subject of hyperphoria in this latter case is likewise greater than in one of more complete displacement. That only a comparatively small proportion of hyperphoric persons experience in marked degree this inability to see small objects well, is probably to be accounted for on the principle that in the great majority of instances the subject of hyperphoria is able either to fuse the images completely, or to displace them to such an extent as to enable a mental exclusion of one image to take place.

The conditions in hyperphoria relating to the adjustments of the eyes through the influence of their motor muscles are extremely interesting and important. The disturbing effects upon the lateral equilibrium is especially noticeable, and is a source of great perplexity to the oculist in his examinations of the muscular conditions. In hyperphoria the tests for lateral deviations are very often contradictory, and in a very considerable proportion of cases unsatisfactory. Unless the examiner is on his guard against the anomaly under consideration, he is liable to fall into grave errors of diagnosis and of practice. These errors are especially liable to occur if we rely for evidence for muscular balance upon the near test as suggested by Graefe. By such a trial we are, in moderate degrees of hyperphoria, likely to find extreme grades of "insufficiency of the interni," when in fact, if the test is made at a distance of twenty feet, the contrary condition is found. It is not an unusual occurrence with the existence of a single degree, or even less, of hyperphoria, to observe with actual esophoria of 2° or 3° (prism) an apparent exophoria in accommodation of 10° or even 15°. Such results illustrate forcibly the danger of relying upon the dot and line test, or upon any similar test at the near point, for determining the propriety of an operation for tenotomy of the externi. Indeed it will not be out of place to remark in the most emphatic manner that the test for "insufficiency" made at the near point should never be taken as a guide for an operation.

This principle of apparent contradiction is well illustrated in the following interesting case. A gentleman was found to have so strong a tendency of the visual axes to deviate inwards that at distances of twenty feet much difficulty was experienced in maintaining single vision. A relaxation of the force of the external recti muscles habitually resulted in homonymous diplopia. The insufficiency as measured by prisms was, however, not more than four degrees. On the contrary, if the gentleman held a pencil or his finger before him at the distance of fifteen or eighteen inches from his eyes, crossed diplopia occurred from "insufficiency of the interni." A pencil held at fifteen inches was doubled to such an extent

that the two images appeared about an inch separated. By the test of the dot and line the insufficiency was only about 6° or 7°.

This gentleman was found to have hyperphoria of 5°, and an operation for the relaxation of the superior rectus of one eye was made, followed a day or two later by relaxation of the inferior rectus of the opposite eye. On the day following the last operation there was no diplopia or even "insufficiency of the interni" at the near point, and binocular vision was maintained with ease at the distance. Several months later the gentleman again complained of double vision at near points, and it was found that hyperphoria of 2° in the same direction as before was now manifest. The inferior rectus of the upward tending eye was now advanced, bringing the visual axes to the same plane, when again the troublesome diplopia at the near points disappeared entirely.

A lady has crossed (heteronymous) and vertical diplopia, both for distant and near points. If a prism of 12° with its base down is placed before one of the eyes, she has at the distance of twenty feet "insufficiency of the externi" of 3°, but if no vertical prism is used, one of 4° with its base in will bring the two images to a vertical line, thus showing insufficiency of the externi with the strong vertical prism, and "insufficiency of the interni" without it. If now a prism of 6° with its base up before the right eye, or with its base down before the left eye, is used, the images of the two eyes blend perfectly.

Thus it appears that as the result of the deviating tendency upward an "insufficiency of the interni," both at near and distant points, may be simulated, while in fact the visual axes may be inward. Not only does the existence of hyperphoria often give rise to an apparent exophoria in accommodation when the real tendency of the eyes is inward, it also frequently presents the indications of exophoria at a distance while the abducting power is much restricted. We may, for instance, find exophoria 2° or 3° (prism), or even more, with a power of abduction not exceeding the apparent exophoria. Here is an evident contradiction, and

it may be, so long as the hyperphoria exists, impossible to determine whether our tests actually indicate an inward or an outward tendency of the visual lines, or neither of these conditions. It is because this important fact of the difference between the relation of the visual lines at a distance and those at near points has in many cases been overlooked, that surgeons of distinguished ability have sometimes performed tenotomy of the externi in cases of supposed "insufficiency of the interni" with the result of obtaining homonymous diplopia, without relief to the symptom of asthenopia. When once the hyperphoria is relieved by operation, we may hope for a more perfect determination of the condition of the lateral muscles. It is not proposed here to discuss the physiological reasons for the complications found in the muscular test when hyperphoria exists; this is a subject presenting many important difficulties, and the phenomena described can be fully explained only by actual experiments upon the muscles themselves. The evidences which may be found, however, that very marked "insufficiency of the externi" may exist when the accommodating and converging functions are at rest, and of "insufficiency of the interni," of possibly very high grade when these functions are exercised, illustrate the very unsatisfactory nature of the terms which have been so long employed in this connection, and appear to demonstrate that the use of terms having such opposite and misleading significations should be discontinued. The relation of myopia to muscular anomalies should occupy a prominent place in the discussion of the conditions dependent upon hyperphoria, but for reasons which will be given, that subject will be reserved for examination in the chapter on exophoria.

Another local affection caused by hyperphoria is hypersecretion of tears, by which the fluid fills the conjunctival sac and overflows the eyelids, causing much inconvenience and often disturbance of vision. These cases simulate the conditions found in obstruction of the nasal duct, and the absence of a general understanding of their nature is illustrated in the frequency with which such cases present them-

selves for treatment, after having been subjected perhaps for many months to the process of probing the tear passages without any success in relieving the affection.

A branch of the fifth nerve supplies the lachrymal gland, and irritations to this nerve resulting from the efforts of correcting hyperphoria may result in so stimulating the gland as to induce the hypersecretion of tears, or it is quite possible that the pressure of the eyelids, which is often brought to bear to assist the ocular muscles in the performance of their duties, may expel the fluid from the gland in inordinate quantities.

Certain marked facial expressions and certain attitudes are characteristic, though not by any means constant in hyperphoria. Certain patients affected with this anomaly when looking indifferently, the eyes not specially directed to any object, will often present an appearance of moderate strabismus, more frequently diverging than converging. One of the eyes may even be observed to swing outward and then inward, giving a certain unsettled expression to the countenance. If, with even these strong indications of ocular deviations, tests for equilibrium are made, the result may be that either slight or even no evidence of lateral vicious tendency will be found. Involuntary convulsive contractions of the muscles of the face, giving rise to habitual distortion, constitute an important indication in some instances, of the efforts which are being made to overcome the effects of hyperphoria.

The habitual spasmodic closure of the lids of one eye should always direct the oculist's attention to the relations of the visual axes in the horizontal line. An effect upon the physiognomy not unfrequently observed is a rigid stare, the eyes being opened very wide, and all the facial muscles being apparently in a state of tension; associated with this peculiarity there is sometimes observed a tendency to snap the lids together forcibly and almost spasmodically.

The characteristic attitude of the head is even more striking and much more frequently observed. The head is carried toward the shoulder, usually to the side corresponding to the eye which tends below the other. This appears

at first thought to be quite inconsistent with the demands for relief. But when we remember that the object seen by the upward tending eye appears lower, and that seen by the downward tending eye appears higher, than the other, it becomes evident that by carrying the head toward the lowest tending eye the images of the two eyes are brought more directly into the horizontal line. In a certain proportion of these cases the contraction of the muscles of the neck becomes permanent, demanding for relief tenotomy of the tendons of the sterno-mastoid muscle; but in much greater number the muscles of the neck will regain their equilibrium either speedily or after some time, when once the vicious ocular tendency is removed.

This peculiar carriage of the head is much more common than would be supposed by one who has not specially investigated the subject. To a close observer familiar with the fact, the false relations of the eye muscles is very often reached even before any of the technical ocular tests are made. Graefe spoke of the turning of the face to one side in cases of "insufficiency of the interni," in order to obtain relief to the lateral muscles or to assist in the mental exclusion of one image. The attitude of carrying the head toward one of the shoulders in hyperphoria is even more characteristic and much more common, and in this case serves to permit of more easy fusion by raising one image and depressing the other. As has been observed above, correction of the deviating tendency of the eyes is followed by an habitual erect carriage of the head.

The more remote results of hyperphoria are those common to anomalies of the ocular muscles, but with certain special characteristics. Neuralgia, neurasthenia, insomnia, chorea, and epilepsy are among the manifestations of this condition. Much more than esophoria or exophoria is hyperphoria inducive of vertigo and epilepsy. The nervous disturbance arising from this cause is more perplexing, both from the difficulty in overcoming it by ordinary effort, and from the complications arising from it in respect to the converging and diverging efforts, than moderate grades of deviating tendencies in the lateral direction. Hence,

nervous phenomena of a higher intensity are liable to result from this condition. The constitutional effects of hyperphoria are well shown in the following illustration:

This case was seen and treated at the Willard Asylum for the Insane. It is proper to remark that this institution is not designed for acute cases, or those in which there exists a reasonable prospect of recovery. It is a home for incurables, and the case here reported was one of chronic epileptic mania belonging to that class. The history is given as it was furnished by Dr. P. M. Wise, the superintendent, and Dr. H. E. Allison, the physician under whose immediate charge the patient was.

M. L., female, aged thirty-six. Insanity commenced seven years previous to the present record, but the patient has been subject to epilepsy for an unknown period, certainly longer than the period of insanity. About once a month she is taken with a series of epileptic seizures, varying from three to eight or more, and at these times is liable to become greatly excited, the degree of excitement depending apparently upon the number of convulsions. A period of great exaltation and frenzy follows, during which she is furious, sings wildly, and shouts at the top of her voice, and is exceedingly destructive and violent. The paroxysm may last several weeks. When it has subsided, she becomes orderly, neat, and industrious, and usually continues so until another series of convulsions occurs.

She was first seen by me July 31, 1886. Examination of the eyes showed hyperopia of moderate degree and right hyperphoria 4° (prism). Glasses for the correction of the hyperopia were furnished, and tenotomy of the right superior rectus was made, followed within a few days by a similar operation upon the left inferior rectus. This final operation was made August 22d. Bromides, which had been previously freely administered, were withdrawn July 31st. August 26th, four days after the last operation, a period of moderate excitement, very much less pronounced than usual, commenced, which lasted until Sept. 12th. On Jan. 2, 1887, five months from the beginning of the ocular treatment, Dr. Allison wrote concerning Miss L.: "She has not, thus far, had any attack of maniacal frenzy, and only one attack (that which is above mentioned) of excitement, which was not great. She says

she has not had any convulsions. . . . She is very much improved, and feels very grateful."

A single other instance will suffice here to illustrate the constitutional effects of hyperphoria:

A lady gave me the following history of her physical condition: She had been subject to asthenopia, severe headaches, vertigo, and backache during all her life, and had hardly experienced any relief during her waking hours. Fifteen years before my acquaintance with her she had been insane, and had been taken to an insane asylum, from which she was removed after a period of nearly one year, but only to return. She was not free from illusions for nine years. With the restoration of reason a new form of nervous manifestation was exhibited. Habitual and frequent paroxysms of vomiting have now continued during several years. The paroxysm commences by seeing every thing in confusion, followed by an indescribable nervous sensation in the back, and finally by violent retching and vomiting, which is greatly intensified when the lady opens her eyes. The paroxysms continue from two or three days to several weeks; the last attack lasted six weeks.

She was found to have right hyperphoria 5°. She was furnished for a time with prismatic glasses, which established a nominal correction of hyperphoria, and after a few weeks tenotomy of the superior rectus of the right eye was made. The paroxysms of vomiting did not return, the lady was relieved of the distressing pain in the head, and soon after the tenotomy she expressed herself as feeling in every way better than she had done during the past twenty years. The lady was not seen during several months, but when finally she did present herself, she complained of suffering again from symptoms of asthenopia, but no more from the general nervous condition. Hyperphoria of 2° was found still to exist, which could not be discovered soon after the operation was made. Another tenotomy has since been made, which has been followed by relief to the asthenopic symptoms.

It will be seen that attending this muscular anomaly, headaches, pain in the back, vertigo, insanity, and habitual vomiting constitute prominent features which followed this lady from infancy; one form of trouble succeeding another, and possibly replacing it for a time, but from some manifestation of which she was never free until she was relieved

from the necessity of a most difficult and perplexing ocular adjustment. With this release came relief from the whole train of nervous symptoms.

Treatment of Hyperphoria.

The treatment of hyperphoria is tenotomy. If the patient is unwilling to submit to a radical relief, or if the surgeon hesitates to perform the operation, if complicating circumstances render such an operation inadvisable, other means may be resorted to. The use of a prism, with its base up or down, is indicated under such circumstances. Let it be remembered that while glasses are of inestimable value, they are still inconvenient and often extremely so; that with the best art of the optician, glasses detract from the symmetry and expression of the face, a fact of much importance to females at least; and finally, that in the conditions of muscular deviations, they neither cure nor afford as complete temporary relief as a removal of the actual defect. Indeed, it is not uncommon for one having hyperphoria of 1° or 2° to suffer much pain in or about the eyes while wearing a correcting prism, but to experience almost immediate and complete relief from all the symptoms caused by the mal-adjustment of the eyes, as soon as tenotomy is performed. Glasses are like crutches, desirable when defects which render them useful cannot be removed. A special disadvantage of a very weak prismatic glass is the fact that it reflects a false image of every strongly illuminated object, seen at some distance, just above or just below the true image. This false image is often extremely annoying.

The daily exercise, continued through two or three weeks, of overcoming prisms placed vertically before the eyes alternately, with the bases in the same direction or before the same eye with the prism reversed, may tend to give the muscles greater vigor, and hence to enhance their ability to endure the difficulty. The duration of the exercise should not exceed three to five minutes at a time.

If tenotomy is performed, the surgeon must choose between relieving the tension of the superior rectus of one or

the inferior rectus of the other eye. If it is evident that the defect can be located in one or the other muscle, of course his treatment should be directed accordingly. This is possible in a very considerable proportion of cases. The appearance of the eyes, when the patient's view is directed indifferently in space, will often aid in forming a correct judgment. The fact that, ametropia being corrected, the vision of one eye is less than that of the other, is a strong indication that this is the deviating eye.

If it is impossible, as in a certain proportion of instances it appears to be, to determine to which of the eyes the anomalous tendency is to be attributed, we are left to select upon more general principles the one to be subjected to the tenotomy. The inferior recti are those which possess the greatest power, and therefore a slight advantage taken from one of these in favor of the weaker muscle will, other circumstances being equal, cause, if possible, less change in the motile functions of the muscles than in the opposite case. If the hyperphoria is of considerable grade, it is better, unless there are very positive indications that the fault lies in a special muscle, to gain the relief by relaxing both the superior rectus of one eye and the inferior of the other. By this procedure, no practical restriction results to the movements of either eye in the vertical direction.

The method of performing tenotomy in these cases of deviating tendencies less than strabismus, has been described by me some years since.[1] Since that time I have found it advisable to modify the procedure somewhat, rendering the operation more simple and the results more satisfactory. As now performed, the eyelids being retracted, a fold of the conjunctiva is seized by a fine but rather rigid pair of mouse-tooth forceps, parallel with the course of the muscle and exactly over its insertion. With a pair of small narrow-bladed scissors, having blunt but very perfectly cutting points, a transverse incision is then made through the membrane, exactly corresponding to the line of insertion of the tendon. The conjunctival opening thus made

[1] "Irritation oculo-névrale": Mémoire de l'Acd. Royale de Méd., Belgium, 1883.

should not exceed in extent one fourth of an inch. With the forceps now pressing the outer cut edge of the conjunctiva slightly backward toward the course of the tendon, the latter is seized behind but very near its insertion. The distance may depend upon the freedom with which the intended section of the tendon is to be made. But in hyperphoria or in slight relaxations of the lateral muscles, a distance barely sufficient to allow a small part of the tendon to be raised from the sclera is all that should be allowed. Making some tension now with the forceps, the points of the scissors are directed against the central portion of the tendinous insertion and toward the sclera, when a small opening is made dividing the centre of the tendinous expansion exactly on the sclera. The small opening is now to be enlarged by careful snips of the scissors toward each border, keeping more carefully on the sclera as the border of the tendon is approached. As the section of the tendon is carried toward the borders, the outer blade of the scissors passes beneath the conjunctiva. If the relaxation of the tendon is to be slight, the extreme outer fibres of the tendon are to be preserved untouched; but if a considerable effect is desired, these fibres can be entirely severed, *provided that the reflection of the capsule of Tenon upon the tendon is not disturbed.* By means of the capsule acting as an auxiliary attachment, the tendon is held in position, but is allowed to fall back slightly while maintaining its relation to the eyeball. In this respect, and in preserving the outer tendinous fibres, this operation differs radically from the ordinary operation for strabismus, and from any operation which has been proposed for so-called "partial tenotomy" of the recti muscles.

The judgment of the operator must determine the extent to which the division should be carried, but should it be found that too little has been accomplished, the section can be extended. In doing this, the use of a very fine hook may be advisable. For this purpose a hook very much smaller and more delicate than the ordinary tenotomy hook should be employed. Its rounded point is carried under the remaining border of the tendon with great care,

to prevent hemorrhage or unnecessary disturbance of the connective tissues; the extension being made toward one and then toward the other border, as the demand for further relaxation may require. When the remaining band of fibres is made tense by the hook it is slightly elevated from the sclera, when the fine-pointed scissors are introduced beneath the conjunctiva, and the necessary extension of the wound is made with extreme caution not to divide the capsular attachment. The conjunctival suture should in no case be employed.

All bandaging of the eye or covers of any description are not only needless but mischievous. Indeed, if permitted to digress from the subject at issue, I would express my unqualified disapproval of bandages in nearly all operations about the eyes. During many years I have abstained almost entirely from the use of bandages in ophthalmic surgery, and know of no reason to regret this course. Bandages are promoters of heat, filth, and septicism. They have no possible advantage, and should, I believe, go out of fashion in ophthalmic operations. My own patients are permitted to return at once from the operating-room to their homes without regard to weather or the distance to be travelled. Many of them return on the day of the operation to their ordinary business.

In respect to the results of tenotomy for hyperphoria there would appear to be nothing in the range of surgery more satisfactory or certain. My first operations for the correction of a tendency of the visual lines to deviate in the vertical direction, and in which no vertical strabismus existed, were made in 1875. Very many were made in each succeeding year, but it was not, however, until during the past two years that the operation in my hands became as uniformly successful as could be desired. Now, with the procedure which has been described above, there is a great measure of certainty of success. During the year 1886 I performed tenotomy for the relief of hyperphoria one hundred and nine times in eighty-eight cases. The result in nearly every instance was, when the patient was last examined, a relief either partial or complete to the hyper-

phoria. In some instances in which, soon after tenotomy, no hyperphoria could be discovered, a partial return to the original condition has been found, and quite possibly this may be true of some who have not been seen since within a month or two of the operations. Of those in which a partial but incomplete relief to the hyperphoria has been accomplished, some are still under observation for treatment. Among these are two cases in which tenotomy of both externi has been performed by prominent oculists, in each instance leaving the patient with homonymous diplopia and pronounced hyperphoria, unless, in one instance, the vertical deviation should be regarded as an original vertical strabismus. In both instances nearly complete correction has been accomplished, and there seems no doubt that in the end equilibrium in all respects will be established.

Of the cases which have been stated to be correct when last seen, it may be repeated that it is possible that, at a future time, hyperphoria of a certain degree may become manifest. This happens in a proportion of cases after some weeks or months, and it is not safe to assume that no hyperphoria exists until many months after the operation.

In respect to the results of treatment of hyperphoria it is my purpose only to say here that the relief in uncomplicated cases is of the most marked, not to say surprising, character. Many patients who, from this cause, have suffered from distressing affections during many years recover, when this source of irritation is removed, with astonishing rapidity.

With little admiration for the practice of introducing slight modifications of well-known instruments as new designs, I think it reasonable, when the old instruments are evidently unsuited to new operations, to suggest such changes as will adapt them to the new conditions. It is in this spirit that I venture to describe such modifications of familiar instruments as I have found best suited to the operation for the relief of the ocular muscles as it has been described in this article.

The scissors have narrow yet strong blades, cutting perfectly at the points, which are blunt, in order that they may

not endanger the sclera. The blade is scarcely wider at the distance of half an inch from the point than at the point. This form permits the narrow blade to be insinuated between the conjunctiva and the insertion of the tendon with the least possible disturbance. I have found much difficulty in having scissors of this description made which, with the very narrow blades, should possess sufficient strength and perfect cutting qualities at the points. After several trials, Messrs. Meyrowitz Brothers have succeeded in producing an instrument combining these requirements.

The toothed forceps are so constructed as to combine much strength with delicacy at the working extremity. The branches are one fourth of an inch broad at their widest part, and taper but slightly until within one half inch from the toothed extremity, where they are suddenly contracted to a very narrow shaft, as fine as the most delicate iris forceps.

The hook is also quite delicate. From the stem, an inch in length, the hook extends by a short curve, at nearly a right angle, to the distance of three sixteenths of an inch. It is rounded and slightly probe-pointed at its extremity. The diameter of the hook and of the principal part of the stem is a little less than 0.5 *mm*, or of the size of No. 25 of Brown & Sharp's wire gauge.

A NEW OPERATION FOR DISTICHIASIS OR ENTROPION, WITH THE RECORD OF A FEW CASES.

By W. F. SMITH, M.D., Chicago, Ill.

(*With three illustrations.*)

AFTER long-continued inflammation of the conjunctiva, as by trachoma or persistent follicular conjunctivitis, atrophy of the inner surface of the lid (conjunctiva), including its free margin, takes place. The lashes, from lack of support and the abnormal distribution of the nutritive processes, fall towards, and curl down upon, the cornea (distichiasis). As the inner surface of the lid contracts, entropion develops. By referring to the text-books, for instance the well-known figure of Waldeyer representing the anatomy of the free margin of the lid, it will be seen readily why the lash loses its upward and outward curve, under the influence of atrophy, to assume the abnormal position spoken of. The cilia are supported by fibres of the orbicularis known as the M. Ciliaris Riolani, situated beneath the cilia and surrounding the ducts of the Meibomian glands near the lower, free margin of the lid. It is to be supposed that these fibres are partly or wholly absorbed in the progress of atrophy, while the Meibomian ducts, sweat glands, and small nutrient vessels are contracted if not almost obliterated. The under side of the lash grows with less rapidity than its upper side, and it naturally curls downwards like a wood shaving before a fire.

All of the operations for narrowing the external surface of the lid, or for excising a portion of the cartilage, or even for transplanting the ciliary margin, are liable to failure in

that they do not correct the abnormal direction or curve of the lashes. These considerations suggested the idea of transplanting a narrow strip of cuticle, without pedicle, in such a manner as to supply to some extent the tissue lost by atrophy at the inner margin of the lid, and in this way lift the lashes away from the bulb. The success has been much more striking than was anticipated, for the lashes were not only lifted from the bulb, but they assumed the normal curve upwards and outwards within three weeks after the operation in all the cases about to be detailed.

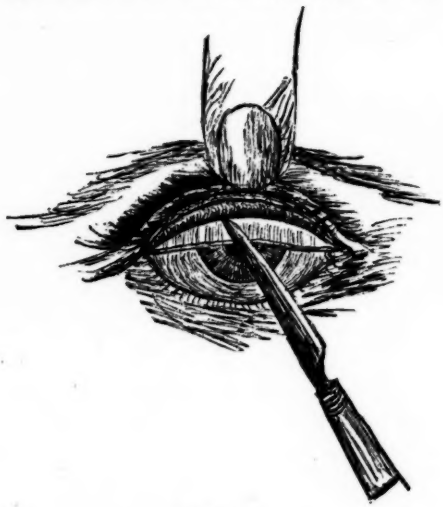

FIG. 1

Mr. Paxon presented himself for treatment Oct. 7, 1886.

Oct. 26th.—Stated that he had suffered from inflammation of the eyes since childhood. On examination the disease was easily recognized as having been true trachoma, the ravages of which were but too readily traced in an irregular corneal surface, pannus, the conjunctiva seamed with cicatrices, and entropion of the upper lids. During the last four years he had been almost continuously treated by different members of the profession in Cincinnati and in this city with more or less benefit. The present hazy condition of the cornea and pannus is evidently due to the irritation of the inverted lashes.

After some preliminary treatment I operated on the left eye in the following manner (October 25th) : Operation at residence on Dearborn Ave. Patient did not take an anæsthetic. First the lid was split in the usual manner for the operation by Arlt's method (see Fig. 1). I made the incision at a uniform depth of

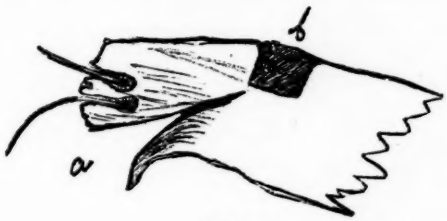

FIG. 2

about 4 *mm*. It extended nearly the whole length of the lid, so as to include, rather exclude, all of the troublesome lashes. The plane of the incision was such that while it followed the inner margin of the lid almost within the conjunctiva, its bottom was about midway between the conjunctiva and cuticle, the

FIG. 3

direction being upwards and outwards nearly at a tangent to the cornea when the parts were at rest—rudely represented in Fig. 2 at *a*. I then made two parallel incisions in the skin above the margin of the lid. These incisions were about 1.5 *mm* apart, as represented in Fig. 3. The cut in the respective ends of the strip of skin made it exactly as long as the slit in the edge of the lid

previously made. Before separating the strip of skin from the underlying tissue, I passed a curved needle, armed with the finest silk, through the end of the strip from without inwards. After drawing the thread partially through, I passed the needle from the bottom of the slit in the edge of the lid, bringing it out through the skin near the canthus. This was done at both ends of the strip, as represented in Fig. 3.

By drawing the threads loosely, the loops of thread including the ends of the strip could be used in the place of forceps. Using them in this way the strip was readily separated from the underlying tissue with a sharp knife, working from the extremities towards the centre. The depth of the strip was great enough to comprise some muscular fibres. Having control of the strip by means of the threads it was easy to lift it over the lashes and adjust it within the slit without allowing it to come in contact with any other part. By simply tying the threads, the strip of skin was drawn accurately into the desired position, and one suture passed through its middle fastened it snugly in the groove. The operation was completed by stitching together the narrow slit left in the surface of the lid.

As the face, eyebrows, and conjunctiva of the patient as well as the operator's hands and instruments had been thoroughly disinfected by means of hot water, a solution (2 %) of carbolic acid, and powdered borax, I felt confident that the transplated tissue would not be lost through septic inflammation.

On the third day I removed the stitches, and found that the entire strip had become firmly united to the parts in its new position. The lashes nowhere were in contact with the cornea. I directed the use of warm water and powered borax for cleanliness more than any thing else. In ten days after the operation the lashes were not only quite above the cornea but had assumed the normal upward curve, and have maintained it since.

Ten days after the first operation (Nov. 5th) I made the same operation on the right eye of this patient. The result is similar in every respect. I saw the patient last week, Jan. 29, 1887. His eyelids do not droop in the least. The eyelashes appear as numerous as they should be; because they are black they make a better showing than would otherwise be the case. The pannus has disappeared, but the corneal surface is still somewhat irregular. $V = \frac{20}{XL}$ r. and $V = \frac{20}{L}$ l. As far as I am able to determine, refraction seems to be emmetropic. Cylindric lenses do not im-

prove vision ; but vision for distance is improved by the stenopaic slit. Patient considers that the improvement is still in progress.

M. Hughes, an inmate of one of the wards of the Cook County Hospital in this city, and under my service, was suffering from the effects of "wild hairs" which he had been in the habit of pulling out with a pair of forceps every few days for a number of years. There is entropion. The lashes are sparse and very delicate. There was at the time of first examination a small ulcer on left cornea. Patient said he frequently suffered from "such spots." There was no pannus. I made the operation, as above described, in his right eye, Nov. 1, 1886. Eight days after I operated on his left eye. This patient had entered the hospital for surgical care of a fractured limb, and remained some weeks after the operation on his eyes. During this time I was able to present him frequently before the class of medical students who had witnessed the operation. The excellence of the result is even better marked in this than in the first described. $V = \frac{20}{xx}$ in both eyes and he reads without difficulty.

Mr. Heartt, proprietor of a livery stable on Ogden Ave. this city, æt. thirty-six, presented himself for treatment Dec. 29, 1886. Case of trachoma. Some granueles still to be seen in the cul-de-sac of both eyes. Conjunctiva seamed with cicatrices. Distichiasis of both upper lids. Operated Dec. 30th on both eyes ; assisted by Dr. Taylor, who administered ether. The recovery was prompt and entirely satisfactory as far as the position of the lashes is concerned. The edges of the lids are even fuller than would seem normal, but I am still treating the trachoma twice per week. Patient reads without difficulty and attends to business with comfort.

One of the greatest difficulties I met with in this operation was in making the parallel incisions, viz.: getting the strip of skin of uniform breadth. Messrs. Sharp and Smith have just delivered a knife which I ordered made for the purpose. It is a double-bladed knife such as was formerly much used in microscopy. By means of a screw the distance between the blades can be regulated at will. I believe it will facilitate the operation very materially.

CASE OF TRANSPLANTATION OF THE RABBIT'S EYE, WITH SUBSEQUENT ENUCLEATION.*

By H. W. BRADFORD, M.D., Boston, Mass.

The patient was a seaman in good health, about thirty-five years of age, whose right globe had become atrophied in consequence of an injury received in early childhood. The stump was removed in the usual manner, except that a strabismus hook was passed beneath the recti muscles and a suture inserted previous to their division from the sclerotic. The atrophied globe having been drawn forward, a needle was entered through the conjunctiva close to the inner canthus, the nerve found, and a suture inserted as near the centre of its substance as possible. The nerve was divided close to the sclerotic, the stump was removed, and the slight hemorrhage resulting controlled by ice. A circular incision was made in the conjunctiva of the rabbit's eye about 5 *mm* from the cornea, the conjunctiva dissected backward, and the tendons of the recti and obliqui divided close to their insertion. The eye being now drawn outwards, the nerve was cut at about 8 *mm* from its sclerotic entrance. Albumen from a fresh egg was poured into the orbit, and the rabbit's eye also dipped in albumen previous to insertion. The suture already passed through the patient's optic nerve was drawn forward and inserted into the optic nerve of the rabbit's eye, and by means of a double slip-noose the ends of the nerves were brought into apposition. One end of the suture was cut short, and the other, which had been passed through the conjunctiva near the inner canthus, was firmly

* The report of the transplantation and the patient's condition for eighteen days following is condensed from an article in the *Bost. Med. and Surg. Jour.*, Sept. 17, 1885.

The delay in reporting the subsequent history, was due at first to the patient's absence, and afterwards to a protracted attack of iritis, which withdrew the writer from professional work.

secured by means of a piece of adhesive plaster to the nose, in order to prevent its being subjected to tension. The four recti muscles were next brought into position and sutured to the subconjunctival tissue, and the conjunctiva attached by four sutures to the band of the same tissue which had been left around the cornea. The lids having been closed, iodoform was dusted over them, and a pad of absorbent cotton and flannel bandage applied. For seven days the parts were left undisturbed, no febrile disturbance or offensive odor appearing. On the seventh day, upon removal of the bandage and pad, nothing of an abnormal character was observed about the lids except a small amount of mucus gluing the lashes together. The cornea presented a slight haziness, apparently superficial; the conjunctiva was chemosed and overlapped the cornea in all directions except externally, where the sclerotic coat was exposed for a space of 8 *mm* long and 6 *mm* wide. This condition was found to be due to the premature sloughing of the suture through the external rectus, which muscle had contracted and drawn the conjunctiva with it; the movement of the eye was good except that divergence was imperfect. All sutures were withdrawn excepting that of the inferior rectus, which was firmly adherent. Atropine was dropped into the conjunctival sac, the eye closed, and iodoform and compress used as before. On the twelfth day after operation the patient complained of some annoyance, which was found to be due to the remaining suture having sloughed away and lodging under the lower lid. The condition of the eye at that time was as follows: Cornea hazy but somewhat less so than when previously examined; conjunctiva well united around the cornea and to the globe; exposed sclerotic on outer side had become covered to about half of its extent; recti muscles working satisfactorily, with improvement in divergence. Atropine and iodoform used as previously.

Eighteen days after the operation the condition of the eye was as follows: Conformation and tension good; cornea improving, and has cleared peripherally so as to allow the iris to be distinctly seen; chemosis of the conjunctiva has disappeared, although the membrane remains congested; exposed sclerotic on outer side of the eye practically covered by the conjunctiva; ocular movements in all directions good.

The patient was again seen in October, when the condition of the transplanted eye was as follows: tension practically normal; cornea showed an opaque contracted cicatrix occupying about

one-fourth of its area, the remaining portion being transparent, and apparently well nourished ; pupil widely dilated, and not reacting to light ; vitreous hazy but sufficiently clear to afford a glimpse of an indistinct white spot in the region of the fundus which should be occupied by the nerve. The patient next presented himself in January, on his return from a three months' sea voyage. Inspection of the eye showed the cornea sclerosed, wrinkled, and opaque ; the entire globe presenting the general appearance of phthisis bulbi without evidence, however, of pain, inflammation, or discharge, none of which had at any time been present during the interim. The advisability of enucleation was considered at this time, but was postponed for the purpose of further observation, and was performed upon his return in the following September, the globe being found firmly adherent at all points where sutures had been used, including the nerve.

GLAUCOMA SIMPLEX (ON BOTH SIDES) IN A CHILD ELEVEN YEARS OF AGE.

REPORTED BY R. L. RANDOLPH, M. D.,

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Lina G., a very intelligent mulatto girl, has noticed for more than a year that her sight has been gradually getting worse. Her father observes that she no longer recognizes small objects at a comparatively short distance. She has, on several occasions, during the past eighteen months, complained of pains in the temples and forehead, but as they were transient in character they attracted very little attention in themselves from either the child or her parents. Has seen no veil or cloud in front of objects—in other words, no "temporary obscurations"—nor has she noticed the rainbow-colored ring about a flame. Her family history gave me absolutely no clue as to the origin of her trouble. Objectively I found the following: R E V = $\frac{6}{36}$; L E = $\frac{6}{60}$; marked *plus* tension in both eyes—indeed the left eye possessed a feeling of stony hardness to the touch. The pupils, though large and somewhat sluggish, presented besides these two diagnostic points nothing marked. Narrowing of the field of vision in both eyes, more especially in the left, on the nasal side. Externally the eyes presented a perfectly normal appearance. The ophthalmoscope revealed transparent media and glaucomatous excavations in both eyes. As there was no material difference in the ophthalmoscopic appearance of the two eyes, I will simply describe one fundus. The vessels were crowded over to the nasal side of the papilla and disappeared with a sharp bend into the depth of the excavation. The veins were twisted and somewhat enlarged. The arteries were narrow, and at points near the border of the papilla pulsated very beautifully. The entire papilla presented a grayish hue, and the outer three fourths

were almost perfectly white. In other points I observed nothing noteworthy in either fundus.

Prof. Chisolm, who saw the case also, tells me it is the youngest that he has ever seen. Not infrequently cases of glaucoma in very young children are seen at the hospital, but they were always complicated with hydropthalmus or keratoconus, and so, of course, must be regarded as secondary.

In a residence of a year and a half in Vienna, during the latter half of which time I served as assistant in the clinic of Prof. v. Reuss, the youngest case of glaucoma simplex (primary) that I heard of, and which I afterward saw, was in a man of twenty-five years.

Here, however, we have the process manifesting itself at the ninth year. The only parallel case that I find in the literature of the subject is that reported by Webster of New York in vol. xvi., No. xvi., of the *N. Y. Med. Record*,

Operation was advised in my case, but declined.

REPORT ON A SERIES OF FIVE HUNDRED SUCCESSIVE CASES OF ENUCLEATION OF THE EYEBALL,

COMPILED FROM THE RECORD BOOKS OF DR. KNAPP'S PRACTICE AT HEIDELBERG AND NEW YORK.*

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AS far as I know, no report of a longer series of removals of the eyeball, such as the present, has ever been made, and as I believe that such a report might be instructive in various ways and throw some light on several disputed points, I undertook to compile it from the large material kindly put at my disposal by Dr. Knapp, to whom I herewith desire to express my sincere thanks.

The great majority, 450, of the operations herein reported were performed at the New York Ophthalmic and Aural Institute, the remaining fifty at Heidelberg. Of those done at the Institute, a certain number were performed by the assistant surgeons, Drs. Pooley, Gruening, Born, and others.

In considering first the **causes** which lead to enucleation, we may divide them in a general way into two classes, the one embracing injuries of all kinds and their consequences, and the other including tumors, the various diseases and their results, etc. Injuries may be either the direct or indirect cause of enucleation; in the former case the damage may be too extensive to permit of the preservation of the

* Read before the section of Ophthalmology and Otology at the N. Y. Academy of Medicine, May 16, 1887.

eyeball, or an active inflammation may be set up, especially by a foreign body in the interior, necessitating the operation; in the latter case the gradual destruction of the eye is the result, this class including the large number of cases of phthisis bulbi and irido-cyclitis.

Turning now to a closer inspection of the causes of enucleation, I find that an **injury**, either directly or indirectly, was the cause in about forty-five per cent. of all cases, 234 eyes having been enucleated on this account. The number would probably be considerably larger if the clinical history of many cases were more complete, as undoubtedly many of the cases entered as cyclitis and phthisis were the result of an injury.

The number of eyes removed immediately or shortly after the injury is comparatively small, viz., seventy, the majority of which were removed on account of the presence of a foreign body in the eye, which had either at once set up an acute inflammation, or the removal of which could not be accomplished. Not less than forty-eight eyes were enucleated on account of a foreign body in the interior, usually a chip of steel or iron, a piece of gun-cap, a bit of stone or glass, or some other small object. In eight of them an attempt at removal was made, in seven of them with the electro-magnet, in one with a hook; in this last case the eye was found to contain two foreign bodies, so that even if one of them had been extracted, there would have been but slight hope of saving the eye. In one case, in which the foreign body had entered five days previously, the magnet raised it, but failed to bring it out, on account of the plastic inflammation which had already begun to fix the foreign body in its position, showing that aside from the danger of suppuration which an infected foreign body may produce, success can attend the use of the magnet only when it is used at the earliest possible date. Two of the cases are remarkable for the long period of time the foreign body had been in the eye. In one sight had been destroyed by a chip of steel in six weeks, and the eye had then remained quiet for ten years; then followed occasional attacks of pain and inflammation, and lately photophobia

and lachrymation in the other, making the removal of the injured eye necessary. In the other case a piece of gun-cap had entered twenty-five years previously; the eye had remained quiet during all that time, but lately had become suddenly inflamed, whereupon it was removed. In the great majority of cases, however, the foreign body had given rise to an inflammation either at once or within a few weeks or months, attended with symptoms of irritation in the other eye, so that the propriety of an enucleation could not be questioned.

As might have been expected, almost all the eyes removed on account of the presence of a foreign body in their interior belonged to persons of the male sex, only three of the forty-eight patients being females. The disproportion is not so great when the whole number of injuries is taken into account, the ratio being about five to one, 127 eyes of persons of the male sex being removed for this cause, and 25 eyes of persons of the female sex. This ratio is still further reduced when the whole number of enucleations is taken into account; of the 500 eyes removed, 365 were those of men and boys, 133 those of women and girls; in two cases the sex is not stated.

Next to injuries, the most frequent cause of enucleation were **tumors.** They were mainly of two kinds—gliomas and sarcomas. The number of eyes removed on account of epithelioma is small, and tumors of this kind almost invariably came from the surroundings of the eye, affecting the latter only. **Glioma** was the cause of removal in eighteen eases, eleven of which belonged to the male, six to the female sex; of one the sex is not mentioned. In eight the right eye was first affected, in six the left; in the remainder it is not stated what eye was affected. The age of the glioma patients varied between five months and twelve years. With only three exceptions, however, their age did not exceed four years. The time during which they had been under observation, when stated, varied between two months and a year and a half. It would be of great interest to know the subsequent fate of these patients, but for evident reasons it is difficult to obtain statis-

tics on this point, as the children disappear from observation. That the chances of escape from death were not good, however, becomes apparent from a review of the cases in question. Five returned with a relapse from within two months to a year, so that their fate could hardly be doubtful; in one case an orbital tumor also was found, the complete removal of which could scarcely be expected; in another the tumor filled the whole vitreous, so that it is not improbable that some of its elements had penetrated beyond the confines of the globe; in still another the optic nerve was affected, thus dooming the patient with almost absolute certainty; while in still two more cases the other eye also had become affected, making death only a question of time. Thus, in ten cases, or about fifty-five per cent, it was almost certain that the patients would die at an early date, and it is not improbable that a relapse occurred in some of the cases which did not return, making the prognosis doubtful even when the tumor was removed at an early stage of its development.

The tumor which occurred most frequently in the eye was the **sarcoma**, thirty enucleations having been performed on this account. In twenty-three cases the patients were men, in only seven women, thus showing a marked disposition of the former for this affection. In fifteen cases the left eye was attacked, in seven the right, in the remainder it is not stated which eye was affected. This would seem to indicate that the left eye is more liable to be attacked than the right, an observation which I believe holds true in regard to other organs symmetrically situated. The age of the patients varied considerably, the youngest being twenty-one, and the oldest seventy-four. The former case, however, is somewhat doubtful, the tumor being situated on the surface of the eyeball, near the cornea, and being ascribed to an injury which had been received only a short time previously. Besides this there was only one other case in which the patient was less than thirty years of age, being that of a young woman of twenty-five. The great majority of cases occurred between the ages of thirty-eight and fifty, not less than eighteen, or sixty per cent., being observed

during that period of life. This confirms the observation that sarcoma is rarely found in the eye before the age of forty. With the exception of two, which were leuco-sarcomas, they were all melano-sarcomas. Of the two cases of leuco-sarcoma little is known. One occurred in a man aged forty-eight, who had been treated six months previously for kerato-iritis; the sclera was perforated at the time. The eyeball was much inflamed when removed and somewhat shrunken. The tumor sprang from the ciliary processes. The other was found in a woman, age not given, and also came from the ciliary region.

As regards the melano-sarcomas, the rapidity of their growth seems to have varied considerably. In one case the eye had been blind for twenty-eight years, and the tumor filled almost the whole of the interior, besides occupying the pupil and the upper inner part of the iris. Of course it could not be determined whether the tumor had been growing for twenty-eight years, but it certainly had existed for a long period of time. In another case sight had gradually been destroyed twelve years before; the tumor had perforated the cornea, and had therefore probably begun to grow many years ago. The shortest period of time which elapsed between the observance of the first symptoms and the removal of the eyeball seems to have been five weeks, the patient noticing that the sight of the eye was becoming blurred. The ophthalmoscope revealed a tumor at the posterior pole, and as there was no doubt of the diagnosis, the eye was removed, although V still was $\frac{20}{40}$ at the time of the operation. On opening the eyeball a typical melano-sarcoma was found, of about the size of a large pea. There can scarcely be a more brilliant illustration of the value of the ophthalmoscope, for without its aid, what man would have dared propose the removal of such an eye?

The tension, when recorded, was found to be increased, with the exception of one case, in which it was normal. The tumor in this instance was fairly large, occupying about one fifth of the vitreous chamber. But such an observation is exceptional, the well-known rule holding good that when detachment of the retina is complicated with in-

crease of tension, a tumor is most likely the cause. The location of the sarcomas varied somewhat, but the favorite one was at or near the posterior pole, six being found there among the eighteen in which the location is mentioned. The ciliary region also was not infrequently the seat of the tumor, four having their origin there and extending backward. In two cases the sarcoma filled the whole interior and even extended into the orbit. Little is known of the subsequent fate of the patients. One, the young woman of twenty-five, died about a year later of metastatic sarcoma of the liver, and it is probable that the two patients in whom the tumor filled the whole eyeball did not survive long; in fact one of them had a relapse three months later. In one case, operated about seven years ago, no relapse has occurred, and the patient is still living. One died, fourteen years after the operation, of sarcoma of the liver and other organs.

Of **carcinoma**, nine cases are recorded, all being of the less malignant type of epithelioma. The youngest patient was a woman aged thirty, the oldest a man aged seventy-two. The favorite starting-point of the tumor was the lower lid, four cases being recorded in which the growth began there. In one case the tumor sprang from the conjunctiva of the globe, in another it came from the orbit, and in still another, it proved to be a cystoid carcinoma, starting from the posterior wall of the orbit. The growth of the tumors, where noted, was slow, fourteen years having elapsed in one case since the neoplasm was first observed. In two cases the removal of the eyeball, though it was intact, became necessary, as it would have been left without protection after the operation. In several cases previous attempts to remove the epithelioma by a plastic operation or electrolysis are recorded, but they proved of only temporary benefit, the removal of the eyeball finally becoming necessary.

One tumor is recorded which was an **enchondroma**, as proven by a microscopic examination made by Dr. Knapp. It occurred in a young woman aged twenty-nine, came from the orbit, and in the course of two years had slowly

destroyed the eyeball. It was not connected with the bones of the orbit, and was partly hard, partly soft in consistence. It consisted of well developed hyaline cartilage tissue.

The other causes of removal of the eyeball may be summed up briefly. A **slow cyclitic process** occupies a prominent place among them, seventy-four eyes having been removed on this account, in which it is not stated what produced the cyclitis. In forty cases a **phthisical eyeball,** causing pain and irritation, was removed; in eight a **painful stump** had to be excised. **Staphylomas** were also a frequent cause for enucleation, forty-one eyes being removed on this account. Of these, sixteen were anterior staphylomas, fifteen total, and ten ciliary staphylomas. They were the result of a great variety of affections, the most frequent being blennorrhœa and injuries. Almost all the cases occurred in younger people, the oldest being fifty-five, and two-thirds of all the cases occurring in individuals thirty years or under. It may be suggested that particularly in the cases of anterior staphyloma abcision would have served the purpose better, the stump produced thereby being much more movable and the cosmetic effect decidedly better. This, no doubt, is true, but the operation, even with the modification practised by Dr. Knapp, of passing the sutures through the episcleral tissue, has not proven entirely safe, sympathetic ophthalmia developing in two cases, though the operation was carefully performed. Of course we must not conclude from this that abscision of staphyloma should be abandoned, but it certainly is not an entirely safe operation, and when in doubt what method to use enucleation should have the preference.

The **other causes** of enucleation are distributed among a great number of affections. In eight cases **absolute glaucoma** was the cause, in six **ossification** of the choroid, in five secondary **traumatic glaucoma,** in four **hæmophthalmus,** in three **megalophthalmus,** in three **choroiditis,** in two **cysts of the iris,** in two **hemorrhagic glaucoma,** in two **hydrophthalmus,** etc.

In regard to the **method of operation** little need be said.

Its first step consisted in the tenotomy of the four recti muscle, beginning at either the external or the internal rectus, and detaching the conjunctiva as close to the corneal margin as possible. After the completion of this step the eyeball was lifted out of its socket by pressing the branches of the speculum behind it, making the division of the optic nerve easier. Care was taken, however, when this manœuvre was attempted in a soft or injured eyeball, lest it burst under the pressure. Dr. Knapp lays stress on the precaution that, during all the cutting, the points of the scissors are in immediate contact with the sclerotic. The eyeball should be shelled out of Tenon's capsule, and the cellular tissue of the orbit wounded as little as possible. In this way hemorrhage and propagation of infection are best avoided.

As regards the application of a suture, I find that it was more frequently omitted than practised, the edges of the wound applying sufficiently well as a rule to make its insertion superfluous. A suture may even be a disadvantage, as in case of secondary hemorrhage it will cause retention of the blood and infiltration of the tissues, retarding the healing.

The operation was seldom attended with any accidents. Among these may be mentioned bursting of the eyeball, an event liable to occur when the cornea has been softened by a large abscess, in staphylomas or but recently-healed extensive injuries. The number of such cases is but small, and in none did unpleasant consequences follow, the removal of the eyeball being merely made more difficult thereby.

The **course of healing** was almost always favorable. In four hundred and sixty-two cases there was either no or very slight reaction, consisting of a muco-purulent discharge or slight swelling of the ocular conjunctiva, causing the patient, however, no inconvenience, and not preventing his early discharge. This usually occurred on the fifth or sixth day. In the remaining cases there was more or less reaction, consisting in swelling of the lids and conjunctiva, free discharge, formation of an abscess, fever, or secondary hemorrhage. In most of these cases, however, the eye was

removed under unfavorable circumstances, or the reaction was due to some complication which had no connection with the operation.

In four cases **free suppuration** is mentioned, in two others it was moderate. In the *first*, that of a man, aged thirty-six, the eye had been destroyed ten years ago by small-pox. It had been painful several times since, but had never affected the other. On the third day, after the operation, the patient began to vomit, and swelling of the lids set in. On the fourth day three or four incisions of the upper lid were made. Hot applications were ordered, and on the eleventh day free suppuration was established. After it had subsided, the openings in the lid were stitched together, and the patient was discharged at the end of four weeks. In the *second* case, that of a young man, aged twenty-six, the shell of a pistol-ball had entered the eye five days before, totally destroying it. The shell was found lodged in the upper wall of the orbit. The lacerated lower lid was sewed up and the shrunken eyeball removed. Next day suppuration began, and two incisions were made, allowing a large quantity of pus to escape. On the fifth day an opening formed near the inner canthus, through which also pus was discharged. The suppuration then rapidly subsided and the patient was discharged on the eleventh day. In the *third* case, that of a boy aged fourteen, a nail had struck the eye the day before, producing a transverse wound through the inner half of the cornea. The anterior chamber was full of pus, only the outer edge of the iris being visible. An attempt was made to save the eye, and although it did well at first, the pain soon returned, T increased, and even perception of light was destroyed. Nine days after admission the eye was removed. Two days after the enucleation the patient complained of headache, swelling of the lids and a purulent discharge began and the temperature rose to 103.2°, and on the following day to 104.5°, when a tonsillitis was discovered. In two days this subsided and the suppuration ceased. The *fourth* case, was that of a young man aged twenty-three. In the *fifth* case, that of a man aged forty-two, the sclera of the phthisical eyeball was so much thickened, that it had to be removed piecemeal; suppuration followed, but soon subsided, the patient being discharged after eight days. In the *sixth* case, that of a woman aged thirty-eight, suppuration began soon after the removal of the

eyeball, making incisions of the orbit necessary. Hot applications were made, and in two weeks the patient could be discharged.

In two cases the discharge of the patient was delayed by the **sloughing out of the centre of the stump,** without any impleasant symptoms. In four cases, one of which has been already mentioned, an abscess of the upper lid developed, making one or more incisions necessary, while in one case there was an abscess in the stump, back of the ocular conjunctiva. In five cases *fever* is mentioned, though in three of them it was only slight; in the fourth, in which the temperature rose to 105° and an abscess of the lid formed, scarlet-fever developed; while in the fifth, in which the eyeball was removed on account of an injury, the fever was probably due to the pharyngitis which set in.

Of other complications might be mentioned **secondary hemorrhage,** which is noted in twenty cases; in fifteen, however, it was slight, the hemorrhage occurring the night after the operation and not affecting the course of healing. In the remaining six cases it was more severe, but in only three it seems to have been necessary to resort to energetic measures; in two of them the hemorrhage was controlled with ice, and in the third sponges and a tampon had to be resorted to. In this last case the hemorrhage occurred on the seventh day after the removal of some suspicious ulcers in the orbit (the eye was removed on account of a melano-sarcoma of the sclera); the patient became very weak, and it seems that he was a bleeder. In two other cases also there seems to have been a marked tendency to hemorrhage, the patients bleeding profusely both during and after the operation; the course of healing, however, was smooth, and they were discharged after seven days. It will thus be observed that the number of cases in which there was marked reaction from the operation is very small; the total absence of cerebral symptoms is especially noteworthy, so that it is hardly necessary to state that the operation never resulted fatally.

Until about a year ago the operation was performed without strict antiseptic precautions. The lids and surroundings were washed with ordinary water, and the opera-

tion was then performed. During the last year, however, stricter measures have been adopted. The lids are first washed with soap and water, Panas' solution is introduced into the conjunctival sac, and the edges of the lids are carefully cleansed with the same antiseptic solution. After the operation it is instilled once more, both eyes are bandaged, and the patient is sent to bed. Ten operations were performed in this manner in six months, and with the exception of some chemosis and congestion in one case and some puffiness of the lids in another, there was no reaction. General conclusions cannot be drawn from such small numbers, but in view of the good results obtained in general surgery, it is reasonable to assume that by adopting similar measures the reaction following the removal of an eyeball can be reduced to a minimum. Samelsohn, who is a believer in the microbian theory of sympathetic ophthalmia, has even endeavored to curtail the indications for enucleation by the thorough use of antiseptics in cases of extensive injury. He abscises the torn parts, disinfects the wound with a spatula dipped into a sublimate solution of 1:5,000, and thus hopes to preserve not only the shape of the eyeball, but sometimes even useful vision. Leber, on the contrary, warns against placing too great confidence in such measures, and relates a case in which, although he had abscised the prolapse of iris, thoroughly disinfected the wound and stitched the conjunctiva over it, slight sympathetic inflammation developed. I believe that the majority of oculists are not prepared to follow Samelsohn. They believe that it is better to sacrifice a hundred useless eyes than save a little sight for one at the risk of losing both.

There are some questions upon which this series of operations may cast some light, the first of which is: **Is it safe to remove an eye in which panophthalmitis has developed ?** Ever since Albr. v. Graefe warned against the removal of a suppurating eye because death followed in two of his cases, operators, swayed by the authority of his great name, have hesitated to excise such eyes for fear of like unfortunate results. But since that time surgery has made great progress, and since the introduction of antiseptics the

fear of a fatal result has been much lessened, and the belief seems to be gaining ground that the danger of the operation has been overestimated, and that by observing proper precautions it may be safely done; nay, some operators, like Alt, go so far as to urge the removal of such eyes, considering the danger of their presence greater than that of excision. English surgeons do not seem to have been very much afraid of operating under such circumstances; Nettleship, in his paper on meningitis after excision of the globe, states that in England such eyes have been and are freely excised. Priestley Smith also, who had two deaths from meningitis and barely saved a third patient from a similar fate, thinks that if proper precautions are observed, the operation is not dangerous. He dusts iodoform into the wound after the bleeding has stopped, carefully watches the temperature, and if it rises decidedly syringes out the wound with a warm solution of some disinfectant. Gunn also does not think there is any danger in removing a suppurating eye, Brudenell Carter, Higgens, and Mules are opposed to an operation under these circumstances. Rolland does not hesitate to remove an eyeball after panophthalmitis has begun, but only when no cerebral symptoms have manifested themselves. He removed seventy such globes, and saw no evil results follow. Alt reports the excision of eight such eyeballs without antiseptic precautions, and had no reaction in any of them. German oculists also are beginning to ask themselves whether they have not allowed themselves to be influenced too much by Graefe's statement, and Jacobson even says that since the introduction of antiseptics there need be no fear any more of meningitis after enucleation of a panophthalmitic eye. They are, however, inclined to substitute exenteration for enucleation, of which I shall say a few words later.

What light do these statistics shed on this question? In looking over the list I find that twenty-one cases are recorded in which the eye was removed during panophthalmitis. It is true that in some cases the inflammation was only beginning, so that the danger of removal was hardly greater than in an ordinary case; in two thirds of the

whole number, however, there was active suppuration, attended with more or less swelling. In all the cases but three the panophthalmitis was of traumatic origin; in two no cause in mentioned, and in one the inflammation was supposed to have been of spontaneous origin. In two cases, the eyeball was removed on account of suppuration which had set in after extraction. In all of these cases except one the course of healing was smooth. In this one case there was great chemosis before the operation, and the cornea had been converted into a yellowish mass. The globe was enclosed in hard, lardaceous tissue, making its removal very difficult. When the sclera was incised, thin pus escaped; the globe collapsed and had to be pulled forward with a hook. After the operation the patient had some fever and an abscess of the upper lid developed. The swelling then slowly disappeared and the result was good. In two other cases the globe was incised, permitting pus to escape, and was removed after the inflammation had somewhat subsided. In still another case the chemosis was so great that no squint-hooks could be used; nevertheless there was no reaction. On an average it was not necessary to detain the patients longer than seven days; the great majority were discharged after five days, and of those who remained longer the stay was lengthened in some because an attempt was first made to save the eye before enucleation was resorted to.

It would not be proper to assert that because in twenty of these twenty-one cases there was practically no reaction, it is entirely justifiable to remove a suppurating eyeball under all circumstances, but they confirm the belief that the danger of the operation has been overestimated. When the panophthalmitis is still in the incipient stage, the danger is of course slight; but when the eyeball is full of pus and there is great swelling of the lids and chemosis, the operator may well hesitate before removing such an eye, preferring rather to afford the pus free escape by incisions and to remove the globe when the inflammation has subsided. From a theoretical point of view the excision of a suppurating eye would seem the proper measure, for

as suppuration is undoubtedly due to microbes, and as they may make their way into the cranial cavity by either the optic nerve or the orbital veins, an early removal of such an eye would seem to be indicated. Deutschmann examined nine such eyes, and found the staphylococcus pyogenes aureus in all of them, and as the meningitis, when it follows an enucleation, must be due to the advent of these microbes into the cranial cavity, it would seem proper to remove the source whence they usually come, namely the suppurating eye. That suppuration of the globe is a potent cause of meningitis becomes evident from Deutschmann's and Nettleship's statistics, who found that in about one half of the number of fatal cases suppurative inflammation, either recent or of some weeks' duration, was present in the lost eye; and as the number of such eyes forms but a small portion of the total number of enucleated eyes the danger of removing them is manifestly much greater, though this does not agree with Nettleship's conclusion, who believes that the excision of a suppurating eyeball is not attended with more than the average risk of meningitis. Brückner,[1] who compiled twenty-six cases of meningitis following enucleation, of which twenty-two were fatal, and in five of which the eyeball was removed during panophthalmitis, concludes that the meningitis is the result of an infection of the wound produced by the enucleation; but by using strict antiseptic precautions, there need be no great fear of removing such eyes. From these facts we may conclude that althongh the introduction of antiseptic precautions may have sensibly diminished the danger of removing a suppurating eye, it is nevertheless an operation which is attended with some risk, requiring more than usual caution in its execution.[2]

Another question suggested by these statistics is: What

[1] *A. f. O.*, vol. xxxi., 4, p. 251.

[2] In the discussion Dr. Knapp stated that he had always been averse to enucleate a suppurating eye, and did it only when there was a pressing reason. His disinclination, apart from the recently published statistics, had been strengthened by a recent case, where an enucleation, after total sloughing of the cornea from hypopyon keratitis, had been urged by the patient, was performed under antiseptic precautions, yet it was followed by orbital cellulitis with cerebral symptoms which for a day had been alarming.

effect does **enucleation** have in **preventing sympathetic ophthalmia?** Of course we must distinguish between sympathetic irritation and sympathetic ophthalmia, the former being only a combination of mainly nervous symptoms and never producing any actual changes in the eye, the latter a more or less severe inflammation. I find that seventy-two eyes were enucleated for either one cause or the other, with varying result. Fifty-one eyes were removed for merely sympathetic irritation, consisting in photophobia, lachrymation, weakness of sight, pain or redness. These symptoms always disappeared, though in some cases they had existed for a long time. In several instances the exciting eye remained quiet for a remarkably long period of time. Thus in one case forty years elapsed before any irritation resulted, in another thirty-three, in a third twenty-eight, and so on. The recovery was rapid, the patients seldom remaining in the house longer than six or seven days.

The cases of **genuine sympathetic ophthalmia** demand a little more attention. There are twenty-one in all, and they present a varying picture. A few were removed after the disease in the other eye had run its course, and the exciting eye was excised for the purpose of determining whether the operation would have a favorable influence upon the other and for preventing any evil effect upon a contemplated operation for improving the sight of the sympathizing eye. Four such cases are noted. In one, in which one eye had been lost by an injury many years ago, there was a slow cyclitic process going on in its fellow, accompanied with occlusion of the pupil and diminished tension. The operation apparently had no effect upon the course of the disease. In another case there was occlusion of the pupil and $V = \frac{1}{\infty}$; an iridectomy was performed a month after the enucleation, and although the new pupil almost closed up, $V = \frac{10}{200}$ when the boy was discharged. In the third case no material benefit was obtained by making an iridectomy. In the fourth case the pupil had closed and the lens become cataractous, so that several operations were required; the *final result*, however, *was very good* and useful sight obtained.

In the other cases the enucleation was performed to prevent the development of sympathetic ophthalmia, symptoms of which had shown themselves in the fellow-eye. The earliest appearance of the disease in the other eye was noted three weeks after the injury had been received, the latest twenty years after; the latter case is remarkable as the eye had remained quiet until lately, when iritis developed in the good eye. The slightly painful stump was enucleated and the patient recovered, though he was obliged to remain in the hospital for five weeks. Another case is worthy of notice because the exciting eye was lost fourteen years ago by suppuration, indicating therefore that this is not a safeguard against sympathetic ophthalmia. Neuro-retinitis and irido-choroiditis had developed in the second eye, but what effect the treatment had, if any, is not stated; from the fact, however, that the patient remained in the hospital only thirteen days, we may infer that the operation and treatment benefited him.

The forms of the disease most amenable to treatment were apparently the cases of simple iritis, of which six cases are recorded. The exciting eye was removed soon after the appearance of the first symptoms, and the patients were either cured or at least improved. In one of these cases V rose from $\frac{4}{200}$ to $\frac{20}{70}$, when a slight relapse occurred; the patient seems to have been discharged soon afterwards, so that the result was probably satisfactory. One case of serous iritis is also mentioned, but nothing is known of the result. Five cases are recorded in which neuro-retinitis was observed as one of the first symptoms. One of these was reported at length in the Transactions of the International Congress of Ophthalmology. Of the other four, two were improved or cured; in one the result is not stated, though probably favorable, as the patient remained in the house only two weeks; and in the fourth plastic iridocyclitis developed and the eye was lost. There are four cases of genuine plastic irido-cyclitis, among which the one last mentioned properly belongs, in all of which sight was ultimately destroyed. The disease took the usual course, the eye improving at times, only to lose by a

relapse all it had gained, until at last not more than perception of light was left. These results conform only in part to the rules laid down by Mauthner, who states that enucleation may be performed as a prophylactic measure, that it should be done in the stage of irritation, but not in serous and plastic iritis. It is just in cases of simple plastic iritis that good results were obtained, and if Mauthner says that the enucleation may convert such an iritis into a plastic irido-cyclitis, I fail to see the logic of his reasoning. Because in the cases he cites the latter disease developed a month or more after the operation had been performed and after the iritis had disappeared, it does not follow that the enucleation was the cause; that would be merely asserting the old fallacy of *post hoc, propter hoc.*

From the results obtained it is fair to conclude that in the majority of cases the operation exercised a beneficial influence, and although it failed to be of use in a minority, no case is recorded in which it can be said that the enucleation did harm.

As thirty cases of death are recorded after enucleation, and as the operation is not a satisfactory one for cosmetic purposes, various attempts have been made to replace it by some other operative procedure. I shall not speak of the division of the optic and ciliary nerves, as these methods were never extensively practised and have been abandoned by the majority of oculists. Neither need much be said in regard to abscision of the cornea and removal of the lens; the applicability of the method is limited, and although the cosmetic effect is excellent, the method is not entirely safe, as has been stated above. An English surgeon, Dr. Mules, lately attempted to preserve the shape of the eyeball by introducing an artificial vitreous into the scleral cavity. The mobility of the artificial eye was excellent, of course, and no untoward consequences followed. The number of such operations, however, is not large enough to justify any general conclusions, and we have yet to learn how long the glass bead in the vitreous chamber will be tolerated.

In late years exenteration in place of enucleation has been widely advocated, especially in Germany. Alfred

Graefe has been particularly active in setting forth its advantages. He prefers it in hopeless cases of injury and in established panophthalmitis, and claims that it is just as safe, if not safer, than enucleation, that it yields a better stump, and that it will be accepted where an enucleation would be refused. Fiske, in a paper on the subject, states that in many cases there is no reaction, while in others it is quite severe, being attended with chemosis, swelling of the lids, and secretion. The operation is also recommended by Deutschmann, Brückner, and in England by Mules. I have seen the operation performed only once, in the case Dr. Knapp described in the ARCH. OF OPHTH., vol. xiv., p. 309. The reaction which followed was so severe that the operation has not been attempted again since that time. The greater mobility of the stump is probably only temporary, for as the scleral tissue forming it gradually must contract, the stump will become smaller and its motion more and more restricted. The greater safety is also very doubtful, and if the advocates of the method point to the thirty deaths after enucleation, and then boast that such a result has never followed an exenteration, they should not forget that the former operation has been practised universally for a long time, and that where one eye has been removed by exenteration, hundreds have been removed by enucleation. As already stated, Fiske admits that in many cases the reaction is quite severe, and it would therefore be well to wait before accepting the claim of greater safety. Until such claim can be established, or some other better method is devised, enucleation will remain the standard operation.

COCAINE IN GLAUCOMA.

By ELIZABETH SARGENT, M.D., of San Francisco.

On the morning of June 25, 1886, I was called to see a woman seventy years old, who was suffering in the left eye from severe pain, which extended over the side of the head. About eighteen months previously the right eye had been enucleated for painful, absolute glaucoma, and in October, 1885, iridectomy had been performed to save what little sight there was in the remaining eye; glaucoma, according to the woman's story, having appeared in it after the other was enucleated.

While the iridectomy was attempted the whole atrophic iris came away; the patient, nevertheless, became blind. This took place before she came under my charge.

I found the eye of a stony hardness; no trace of the iris; the media sufficiently clear to see the characteristic excavated optic disc; no perception of light. There had been a slight catarrh of the lids, which was relieved by a mild astringent, but no pain in the eye since the operation. About ten days before the neuralgic attack came on she knocked her eye severely, and although it did not feel quite as well as previously, she said nothing about it till she sent for me on June 25th.

She would on no account consent to an enucleation, and from past experience knew that morphine did not relieve the pain, as she could not take much of it because of an idiosyncrasy. So I decided to try what cocaine would do for her, especially as the absence of the iris would preclude aggravation of the symptoms from the crowding of that structure into the angle of the interior chamber by dilatation of the pupil. I used a five-per-cent solution, one drop every five minutes, until six drops had been instilled. In twenty minutes the pain had been entirely controlled. Toward night there was some uneasiness, and the cocaine was repeated in

the same way, thus insuring a comfortable night. The same was done the morning and evening of the 26th, so as to ward off a return of the trouble. By that time I was pleased to find that the eye looked clearer than before, and that the tension was almost normal. I was particulalry struck by this reduction in tension, as the most I had expected from the cocaine was its anesthetic effect. She said the eye felt lighter and more natural than it had for months.

The cocaine produced some dizziness and hallucinations, which, on the administration of small doses of an alcoholic stimulant, gradually passed off in two or three days.

Soon after recovery the woman was taken to a Home, where the eye remained comfortable and free from pain for six or seven months, when she struck that side of her face again, producing erysipelas, and had some pain in her eye, as I was told. I did not see her, as she was in a place not readily accessible and no longer under my charge.

This case seems interesting to me because of the opportunity it afforded to test the effect of cocaine on the pain and high tension in glaucoma when used without any other remedy. Should a similar case again occur, I should try a weaker solution.

TOLERANCE OF FOREIGN BODIES IN THE ORBIT AND THE EYE. A FEW CASES REPORTED IN ILLUSTRATION.

By Dr. W. W. GARDNER, of Springfield, Mass.

Case 1.—A man, of fifty years, presented himself for treatment with the following history. About six months previously, while using a machine-saw, a splinter was thrown off from the wood and penetrated the tissue between the eye and nasal side of the orbit. He removed, as he supposed, the whole of the splinter. Severe inflammation followed, which eventually yielded to time and treatment, leaving a fistulous opening, from which issued a small purulent discharge. Vision was not disturbed, and the eye appeared free from any lesion. There was some tenderness in the region of the wound, and probing the fistula revealed a foreign body. I surmised its character, and endeavored to extract it with small forceps; these failing, a resort to some dressing forceps and considerable force caused it to yield. Its length was 3 *cm.*, width at its proximal extremity $\frac{1}{2}$ *cm*, tapering to 2 *mm*, thickness $\frac{1}{2}$ *mm*. Its distal end appeared to have been torn from another portion deeply imbedded. Probing failed to demonstrate any more of the wood.

I theorized that its tenacious fixation, which had held it there so long and which made it so hard to remove, was in consequence of penetration of the bony wall of the orbit.

The wound was cleansed with a solution of boracic acid and dressed with adhesive plaster and a drainage-tube.

My patient did not report again until after six months. The fistulous passage had nearly healed, but an abscess had developed in the upper part of the orbit, which was pointing just below its border. The abscess was opened, and with the discharge of pus there also came forth another splinter of wood, $1\frac{1}{2}$ *cm* long, which

evidently was the remainder of the original stub. Cleansing the abscess and dressing it like the first time, it soon healed. Aside from some protrusion the eye at no time appeared to suffer.

The result changed my theory concerning the nature of the accident. The splinter entered the orbit following its curve, passed in back and over the eye instead of wedging itself in the bony wall. The lengthy toleration of so large a foreign body, and its happy adaptation to the curves of the eye without affecting the optic nerves or other important tissues, are, at least, novel circumstances.

Case 2.—A gentleman came to me to have a cinder removed from the cornea. During the manipulation I discovered just beneath the eyebrow what, at first, appeared to be a horn. Permission having been given to examine it, I soon drew forth a charred round twig of hard wood, 1½ *cm* long and 3 *mm* in diameter. The patient said that eight months before, he was wounded in the eye, and was under the daily care of a physician six weeks. The inflammation and suffering had been very severe, but during a few months latterly the annoyance had been slight and limited to a trifling suppuration around the head of the stub. He had not suspected a foreign body. The course of the stub was backward into the areolar tissue of the orbit. Vision was normal.

Case 3.—C. D., a laboring man, was working on the roof of a building a hundred feet from others who were blasting gravel. In one of the blasts a pebble stone was thrown which struck and passed through his upper eyelid and imbedded itself in the eye. A physician was called who dressed the eyelid but failed to discover the pebble. Ten days later, the patient not being able to see, reported to me. Although the foreign body was nearly one third the size of the eye, its shape and position presented so smooth a surface that the motion of the upper eyelid was not interfered with and its presence not suspected. After removal of the foreign body, recovery was good with a fair stump.

Case 4.—A young man was wounded in the cornea by some splinters of steel. The cornea was bruised and lacerated and the ciliary region torn. Quite a large piece of steel was removed, and the eyes improved rapidly. Two weeks later, he reported for examination. Just below the cornea the tissues appeared broken

and a dark discoloration indicated a foreign body. It was found to be metallic and was drawn out with the aid of a strong magnet. It measured 4 *mm.* in length and was the size of a No. 20 wire. Two years later vision $\frac{20}{20}$.

CASE 5.—E. F., a boy fourteen years of age, while passing by a wood bench, struck it with a hammer. From the bench or hammer a "fire" was thrown into his eye, which passed through the cornea and lodged in the circular muscle of the iris. It was easily demonstrated, and on opening the anterior chamber for its removal, hemorrhage followed and stopped further proceedings. Another effort was not made to remove it. After a few weeks of careful nursing it encysted, and all irritation ceased. Several years afterward vision was $\frac{20}{20}$. A slight distortion of the pupil and a prominence where the steel rested, was the only evidence of the original injury.

CLINICAL COMMUNICATIONS.

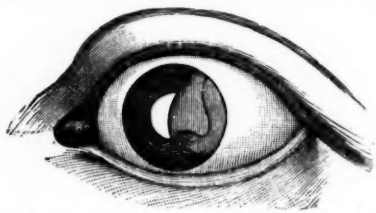
By GEO. REULING, of Baltimore.

I.—*Cyst of Iris Destroyed with the Galvano-Cautery.*

(*With a wood-cut.*)

Joseph Seipp, twenty-eight years of age, was wading, during the summer of 1879, through an almost dried-up stream, and in separating the high grasses and bullrushes to see his way clear, he was struck in his left eye by one of the sheaths. The eye became at once inflamed, and remained very irritable and painful for several weeks, but finally ceased to be troublesome, and sight was apparently undisturbed. Very gradually, however, vision became cloudy, which fact induced the patient, after nearly four years of waiting, to seek medical advice.

On the 28th of September, 1883, the examination of the eye showed at once its characteristic affection—a cyst occupying the whole outer half of the anterior chamber of the left eye. It emanated from a small cicatrix in the outer and upper sclero-



corneal margin, to which a small piece of iris was adherent. From this matrix a thin blood-vessel was accompanying the inner surface of the completely transparent cyst-wall until it almost reached its floor. At this point it ended apparently with a free opening, it evidently having been ruptured, as a few particles of

coagulated blood were deposited upon the floor of the cyst. This small coagulum changed its position according to the position of the patient's head, similar to a hypopyon. The exact measurement of the cyst was 7.5 *mm* in greatest length, and 4.2 *mm* in its greatest width. The liquid contained in the cyst was perfectly clear, and showed only as a sediment the small blood-coagulum mentioned before. The iris was atrophic at the starting-point of the cyst, but showed no residue of former iritis. The crescent-shaped pupillary space reacted almost normally to light, and the lens appeared clear and slightly pushed forward and inward.

The **operation** for its removal consisted in a broad iridectomy, the incision for which was entirely made within the scleral border and immediately behind the cicatrix from which the cyst had started. The operation was not quite as simple of execution as I here described it, inasmuch as the cyst could not be removed without being pierced by the Graefe knife, so that the removal of the atrophic iris and the exceedingly fine and collapsed cyst-wall, especially around the matrix, required repeated piecemeal removals of these very fragile tissues. After having completely cleared the broad coloboma of every visible particle of cystic tissue, I finally cauterized the matrix with a pointed caustic stick, and applied a pressure bandage.

The process of healing was comparatively kind; the wound closed within twenty-four hours, and neither iritis nor serious ciliary symptoms were observed during the fifteen days the patient spent at the Institute. On his dismissal his vision had improved to nearly one half, and No. 7 Jaeger could be read with $+\frac{1}{24}$. Later I saw him from time to time, and for nearly a year I was under the firm impression of having permanently relieved him of his dangerous new formation. On the 15th of September, 1884, when I had not seen the patient for over three months, he came again, complaining of his eye, which had become exceedingly painful and nearly blind. The examination by oblique illumination revealed the presence of a new cyst starting from the same old point within the cicatrix caused by the first accident. Feeling confident that the extirpation of the cyst in the usual way would afford no permanent relief, and being anxious to save the eye if possible, I made a small incision through the matrix and immediately in front of the former incision for the iridectomy. Having introduced through this opening Liebreich's iris-forceps and pulled out the cyst *in toto*, I clipped off the latter as close as

possible to the incision. I then introduced the platina needle of the galvano-cautery, and by moving it gently up and down within the narrow area of the matrix I destroyed all the tissue that I reasonably could expect to be capable of producing a new cyst. On the removal of the needle, which I had kept at white-heat and in contact with the cicatrix for about half a minute, I found that an oval defect had been caused, preventing the complete apposition of the corneo-scleral wound. I therefore united the wound by a silver suture. A pressure-bandage was applied, and strict rest enjoined. During the first night the patient complained of severe ciliary pain and copious lachrymation. After the first twenty-four hours the anterior chamber was not yet re-established and there was considerable chemosis around the wound. The wound, however, closed completely without disagreeable symptoms, for on the fourth day the suture was found lying in the fornix of the conjunctiva, with particles of exfoliated tissue resulting from the burning of the lips of the wound. The lens remained clear throughout the process of healing, and vision had again returned to nearly its former degree. The patient was dismissed twenty-one days after the operation, and was seen by me about every month for the next six months, when I could notice a steady improvement of his eye until Jaeger No. 5 could be read with $+\frac{1}{24}$.

The last time I saw the patient was fourteen months after the galvano-caustic destruction of his cyst. His eye did not show the slightest symptoms of a return of the trouble. The other eye had been free from irritation. The patient, an intelligent and prudent man, was desirous to establish a mercantile business in the West. I saw no objection to his doing so, but asked him to inform me at once if there should be a recurrence of his eye trouble. Not having heard from him since, I fairly consider his case as an instance of a permanently successful removal of a traumatic cyst of the iris.

II.—*Syphiloma at the Sella Turcica Causing Engorged Papilla and Ending in Complete Recovery.*

On the first of February last, Judge R., aged forty-six years, an ex-member of Congress and one of the most prominent lawyers of a Southern State, was brought to my office in the following condition: Left upper lid was in a state of complete ptosis, both eyeballs were considerably protruding, so that the intact lids of the

right eye could not be closed completely. Every eye muscle in both eyes was either paretic or paralytic, with the exception of the external recti, which caused both eyes to occupy a divergent position in which they were almost immovable (oculomotor-paralysis). Both pupils were dilated *ad maximum*, a most singular circumstance, as usually in cases of paralysis of the third pair the dilatation of the pupil is only moderate. On questioning the patient whether atropia had been used, he answered in the negative. His facial expression was staring and reminding one of animal stupidity. His gait was staggering, his speech heavy, and his sentences frequently disconnected. The latter symptom was even more pronounced before the Judge left his home, so that his physicians expected at any moment an outbreak of acute mania. The examination of his eyes revealed the following condition: The greatly enlarged pupils completely irresponsive to light, optical media transparent and normal, mobility of the eyeballs reduced to a minimum, position of both eyeballs divergent, conjunctiva considerably hyperæmic and suffused by subconjunctival serous infiltration, as also was the orbital tissue. Vision in each eye amounted yet to $\frac{1}{7}$, field of V showing in each eye a central scotoma. On examination with the ophthalmoscope the most pronounced neuroretinitis was observed. Both optic discs were positively globular and greatly enlarged, so as to bulge considerably above the level of the retina. The discs as well as the retinæ were dotted all over with innumerable hemorrhages, the largest ones being close to the macula lutea, without covering it however. The line of demarcation between the optic disc and retina had disappeared, and it was a source of considerable interest to have so large an amount of vision retained yet in an optic nerve and retina so thoroughly pathological in their appearance.

A prominent oculist in Washington who kept this case under the closest observation for four days, diagnosed it as neuroretinitis morbi Brightii, and prepared the wife for a speedy fatal termination. As I could find only mucine and neither albumen nor renal casts of any description, and further, in the absence of hydropic symptoms and any heart affection, and further, in view of the immense protrusion of both optic nerves, the serous infiltration into the orbital tissue, owing evidently to stasis in the ophthalmic vein and its tributaries, I was convinced of the presence of a tumor on the base of the brain, most likely on the sella turcica, and very probably of syphilitic origin.

My treatment, therefore, consisted in the removal of two ounces of blood from each temple by Heurteloup's artificial leech, and the systematic inunction of the blue mercurial ointment in half-drachm doses into arms and legs, with the internal administration of iod. potassii in ten-grain doses three times a day, for the purpose of producing speedy action.

An improved condition of the patient set in almost with the moment treatment began. Twelve hours after the blood-letting and first inunction, the ptosis (of the left lid) had diminished, and the excruciating headaches which had existed for weeks, and which had been ineffectually combated with the strongest doses of chloral and various narcotics, had ceased for the first time. In twenty-four hours mobility of both eyes had perceptibly increased, and the infiltration of the conjunctiva and orbital tissue disappeared visibly, so that both eyeballs had perceptibly receded into their orbits. After two days the right eye had taken its central position and showed the returning activity of the internal rectus muscle, as convergence could be produced at will. The ptosis had now completely disappeared, and both lids could be closed normally over the eyeballs. With all these improvements of the external symptoms the recovery of both retinæ and optic discs held even pace. The swelling and infiltration of the disc was considerably lessened, and more than one half of the hemorrhagic spots had disappeared. As both pupils had so far remained largely dilated, I instilled a one-half-per-cent solution of eserin into each conjunctival sac. The contraction which followed this application represented the pupils at their normal size, in which condition they remained and acted normally toward light. On the fifth day the paretic condition of the eye muscles had almost disappeared, and there was never a recurrence of the much-threatened headache since the moment treatment began. These headaches had appeared daily for weeks, and had made existence almost unbearable; they produced all the symptoms of severe brain-pressure, vomiting, comatose deliria, and complete exhaustion from agonizing pain. The mental faculties of the patient had reached their normal status, so that I felt safe in dismissing the case on the sixth day of treatment, with a letter to his physician, and with the advice to continue specific treatment and report once every week at my office for examination and further advice. The improvement in the visual power was as rapid as any of the other symptoms, so that five days after the beginning

of treatment vision had improved to one half, and No. 11 Jaeger could be read with $+\frac{1}{18}$. The central scotomata appeared now as a fine haze overhanging objects in the centre of the visual field. The inunction treatment, as well as iod. potass., was continued for nearly two months with short intermissions, and at present, three months after the beginning of treatment, not a trace of the former pathological lesions can be observed. Vision is normal, as is also the action of the muscular apparatus of the eyes and eyelids. The mental capacity of the patient may be judged from the fact that in the first week of May he tried a case involving many hundred thousand dollars, in which his speech of defence lasted fully two days and was followed by the success of his client.

III.—*Granuloma Sarcomatosum Corneæ of Seven Years' Standing.*

Herman Miller, of Uniontown, Md., (twenty-two years of age), applied to me for the removal of a growth situated at the inner margin of the cornea of his left eye. The growth was hemispherical in shape, and of the size of a small pea. It had a fleshlike granular appearance, and consisted of many little lobuli, between which a great many fine blood-vessels formed a dense network. The color of the growth was that of a deep red, and became paler on pressure ; it was succulent, and the epithelium was evidently thickened.

About two thirds of the tumor was firmly attached to the superficial layers of the cornea, and the balance to the superficial layers of the sclerotic. On examination the eye itself was found normal, the anterior chamber remained uninfluenced by the presence of the corneal growth, and ciliary injection existed only in its immediate surroundings. The examination of the conjunctiva did not reveal granular conjunctivitis, or any inflammatory changes. This tumor evidently owed its origin to traumatic injury, in the absence of any other more plausible cause.

The patient informed me that seven years ago a little brother of his ran a pointed stick of wood into his eye, after which considerable irritation, sensitiveness to light, and lachrymation existed, which gradually subsided, but was followed by a red spot in the place of the former injury, from which very gradually the above-described tumor developed. There was only occasionally some shooting pain, and slight lachrymation accompanying the growth. Of late the progress of the tumor was somewhat more rapid, and

on various occasions small, mostly punctiforme, capillary hemorrhages made their appearance upon its surface.

As the patient desired to be relieved of the tumor, which had caused him much uneasiness during the last few weeks, I extirpated it together with the superficial layers of the cornea as far as blood-vessels would extend. After cauterizing the flat loss of corneal substance left on removal, I applied atropia-solution, and pressure bandage. The patient remained at the institution seven days, during which time I had carefully destroyed by galvanocautery every capillary vessel that made its appearance within the scar, in order to prevent a return of the growth, and finally dismissed him with a slight corneal opacity in the place of the tumor.

The growth itself appeared considerably smaller after removal, owing to the emptying of its blood-vessels. I placed at once a small particle of it under the microscope, and after tearing it with needles on the object glass in a drop of distilled water, I noticed that the structure consisted of sarcoma cells in the different states of development, and especially of large mother-cells, containing often three to four round daughter-cells with divided nuclei. The exceedingly fine and transparent connective tissue formed denser strata around the large cells, and made them appear as imbedded in capsules. There were none of the lobular formations described by Iwanoff and Berlin in such tumors, nor were tubular glands of the conjunctiva extending into the interior of the growth; a few of the latter were visible on the surface, as crypt-like excavations (Papillar-Vertiefungen).

I do not doubt that the tumor in question was a granular sarcoma (Sarcoma globocellulare mixtum), as the comparative scarcity of the multiple small round cells, and the prevalence of spindel cells in every state of development indicates the pathological substratum of mixed sarcoma.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE THIRD QUARTER OF THE YEAR 1886.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc.

Translated by Dr. F. E. D'Oench, New York.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

292. Bogajewsky. The need of medical aid among the people in diseases of the eye, and the necessity of satisfying it. Paper read at the first meeting of Russian physicians at St. Petersburg.

293. Braun. Text-book of ophthalmology. Second revised edition. Moscow, 1886, p. 121.

294. Korussewitsch. Vision of the marines of the Black Sea fleet. Medical supplement to the Morskai Sbornik (*Marine Journal*), Sept., 1886. The article has not yet been concluded.

295. Magnus. The blindness of youth. Clinico-statistical study of the forms of blindness occurring during the first 20 years of life. Wiesbaden, 1886, J. F. Bergmann.

296. Rampoldi. Contribution to the knowledge of the causes

of blindness with reference to their geographical distribution. *Ann. di Ottalm.*, 1886, Nos. 2 and 3.

MAGNUS (295) reports on 3,204 cases of binocular, incurable blindness, which occurred during the first 20 years of life. They were collected from 64 European institutes for the blind, according to a schedule prepared by himself. In the large majority of the institutes the examinations were conducted by oculists. Among the 3,204 cases 17.19 % were due to congenital blindness; 33.08 % to idiopathic diseases of the eye; 8.15 % to injuries; 33.17 % to constitutional affections. In 8.40 % the cause could not be discovered. Congenital blindness may be due to heredity; malformation of the progenitors' eyes may be transmitted either directly to their descendants, or the progenitors have healthy eyes and transmit to their children only some ocular malformation occurring in their family, or some constitutional disease of the progenitors becomes the cause of the heredity of blindness. Congenital blindness may also be due to consanguinity of the parents, but the author has well-founded doubts on this subject, and expresses his view as follows: Marriage among relatives is not a cause of disease to their children. Congenitally blind children are frequently the result of the marriage of relatives, but this is merely due to a disposition to disease common to both parents. Congenital blindness may also occur in cases in which heredity or consanguinity cannot be traced, as the result of a congenital disposition, so-called "collateral heredity"; and finally, spontaneous diseases of the eye in utero can become the cause of congenital blindness. The author carefully reviews the various forms of congenital blindness, for which we must refer to the original. The report will be of great interest in a considerable number of those cases in which congenital atrophy of the optic nerves or atrophy acquired early in youth is complicated with oxycephalia, a combination of symptoms which is but little known, but seems to occur not infrequently.

Among the forms of blindness due to idiopathic diseases of the eye blennorrhœa neonatorum is particularly discussed; its percentage is 23.50, the percentage of females being about 8 larger than that of males. Blennorrhœa was the cause of blindness in 71.99 % of all the cases in which sight had been destroyed during the first year of life. Its power to produce blindness is not equalled by any other form of disease, not even in later years; after the age of 60 glaucoma alone surpasses it. Blennorrhœa is

more destructive among illegitimate than legitimate children, and seems to occur more frequently in the cities than in the country.

As regards blindness due to injury, we would like to call attention to the fact that sympathetic ophthalmia occurs much more frequently in young persons than in adults. No explanation of this fact can yet be given ; but it should warn us to remove eyes blind from an injury, especially in children, as soon as possible. Among constitutional diseases small-pox furnished a large percentage. The value of vaccination is clearly apparent from the statistics ; for the number of persons blind from small-pox is but a few per cent. in countries like Denmark, Germany, and England, where vaccination is compulsory, while it is very large in countries in which such a law does not exist ; for instance, the institutes of Austro-Hungary contain more persons blind from small-pox than from blennorrhœa, a ratio which should set the opponents of vaccination to thinking. The paper concludes with a formula for calculating the danger of becoming blind at the different periods of life.

According to RAMPOLDI (296), malaria and pellagra favor the development of diseases of the eye in persons who inhabit the lowlands of the Po surrounding the city of Pavia. Essential hemeralopia with consequent retinitis pigmentosa frequently occurs, or glaucoma, or hypopyon keratitis.

b.—STATISTICAL PAPERS.

297. DESPAGNET. Comte rendu statistique des maladies des yeux à la clinique du Dr. Galezowski du 1 Septembre, 1884–1 Septembre, 1885. Number of patients, 9,522.

298. FIEUZAL. Enumération des opérations pratiquées pendant de 3me trimestre de 1886—enu.nération sommaire des maladies observées pendant le 3me trimestre de 1886. *Bull. de la clin. nat. ophth. de l'hospice des quinze-vingts.*, July–Sept., 1886. Number of patients treated, 2,612 ; number of operations, 496, among them 135 cataract-extractions, 21 discissions, 38 enucleations, 64 operations on the iris, 20 on the muscles.

299. STEFFAN. Twenty-fourth annual report on Dr. Steffan's Ophthalmic Institute at Frankfort a/m, Jan., 1886.

300. TEPLJASCHIN. Short report on the eye-patients in the hospital at Glasow, district of Wjatka, from May, 1884, to Sept., 1885. *Wjestnik. ophth.*, 1886, No. 3.

STEFFAN (299) treated 6,013 eye-patients and performed 459

operations, among them 35 cataract-extractions, 33 of which were successful, 2 failures. He performed 26 iridectomies, 8 of them for optical, 5 for therapeutic purposes, 13 as a preliminary to extraction. Enucleations, 6 ; tenotomies, 16.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

GENERAL PATHOLOGY AND THERAPEUTICS.

301. CHEVALLEREAU. Nouveau mode de pansement en thérapeutique oculaire. *Rec. d'ophth.*, Aug., 1886.

302. KNAPP. On pyogenic micro-organisms. Amer. Ophth. Soc., *Med. Rec.*, Aug. 7, 1886.

303. LAGRANGE. L'opération de Badal. *Arch. d'ophth.*, vol. vi., Nos. 1–3.

304. PICQUÉ. Anomalies de développement et maladies congénitales du globe de l'œil. *Thèse de chir. de Paris*, 1886.

CHEVALLEREAU (301) advises to place gelatine tablets, containing the remedies to be employed, on the eye and fix them in position with cotton and a bandage. The tablets dissolve, producing the desired effect. Small rods of gelatine may also be introduced into the lachrymal canal.

KNAPP (302) believes that, in order to produce infection, a certain quantity of infectious material is necessary ; when it is too small, no infection takes place. Polished instruments are sufficiently disinfected by washing them in water and wiping them with clean cloths.

Badal's operation, the subject of LAGRANGE's (303) monograph, consists in tearing out the n. infratrochlearis (n. nasalis ext.) or one of its three terminal branches respectively, and is recommended by Badal against constant ciliary pain in eye diseases of various kinds ; formerly he recommended simple stretching. The effect is said to be the greater, the less the local affection in proportion to the pain. In the part which has thus far appeared, the author, after a brief review of the history and literature of the operation, describes the anatomical conditions, the technique of the operation, and the accidents and dangers attending it. Evil results, such as follow the stretching of other nerves, hemorrhages, and softening in the central organ need not be feared. Sometimes, however, the wound suppurates, in spite of strict antiseptic precautions, and occasionally, though rarely, even gangrenous

phlegmon sets in. Among five cases the author saw three of slight phlegmon. Keloid scars must be excised. He thinks the effect of the operation is due to the disruption of the sensitive root of the ciliary ganglion, or to an ascending neuritis of the torn nerves extending to the ganglion. He also attributes some influence to reflex action. According to Lagrange the operation is one of the best in ophthalmic surgery, an assertion which he tries to prove in the clinical part. He relates briefly the history of eighty-one cases and the results obtained in them. (1) In citing neuralgia (four cases), the results were insufficient and seldom permanent, similar, therefore, to those of resection and stretching of the frontal nerve. (2) In the various forms of glaucoma better results were obtained ; the pain in particular disappeared, tension decreased, and vision increased even in cases in which sclerotomy and iridectomy had failed. But when the author expresses his belief that Badal's operation should first be performed in all cases of glaucoma, we are justified in not agreeing with him. (3) In acute ciliary pain, the result of traumatic irido-cyclitis, incarceration of the iris, etc., the best results were obtained. An enucleation can frequently be thereby avoided which otherwise would have become necessary. In chronic ciliary pain the results are not so good, but, nevertheless, sufficiently good to justify the attempt.

v. MITTELSTÄDT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

305. OLIVER, C. A. New series of wools. Amer. Ophth. Soc., *Med. Rec.*, Aug. 7, 1886. All of the colors are of the same relative intensity.

306. PANAS. Nouvelle seringue pour le lavage intraoculaire. *Arch. d'ophth.*, vol. vi., No. 5.

Luër has designed a syringe according to the ideas of PANAS (306) for washing out the anterior chamber. It is made of glass and hard rubber, capable of resisting the action of mercury, prevents the entrance of air-bubbles and the contamination of the liquid through the piston, which is wrapped around with asbestos, and is free from fat, and also permits of regulating the pressure. The shape is that of a large Anel syringe, the canula, bent and flattened in front, has at its lower end on both sides a solid projection, so that the instrument can be firmly grasped.

v. MITTELSTÄDT.

b.—REMEDIES.

307. COGGINS. Protracted action of hydrobromate of homatropine in spasm of the accommodation. *Amer. Journ. Ophth.*, July, 1886. The complete paralysis of accommodation lasted four days after the instillation of two drops of a solution of homatropine of 1:60.

308. LANG and BARRETT. The action of myotics on accommodation. *Ophth. Hosp. Rep.*, vol. xi., July, 1886.

309. RAMPOLDI. Experiments on the physiological action of jaborine on the eye. *Ann. di Ottalm.*, 1886, Nos. 1 and 2.

310. TROUSSEAU. Note sur le santonate d'atropine. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, vol. iv., No. 3.

311. DE WECKER. Eserine injection and eserine bandage. Congr. de la soc. franç. d'ophth., *Prog méd.*, May 22, 1886.

RAMPOLDI (309) has made the following observations on the action of jaborine: when introduced into the conjunctival sac it enters the anterior chamber by osmosis, and produces medium dilatation of the pupil without affecting the accommodation. The dilatation of the pupil is probably due to paralysis of the oculomotor nerve. Mixed with pilocarpine it preserves its mydriatic action, although the myotic action of the pilocarpine is first produced; it diminishes the myotic action of the latter drug, as well as its influence on the secretion of the saliva and perspiration.

TROUSSEAU (310) found that santonate of atropine does not irritate the conjunctival sac, and has about the same effect as the sulphate. He also claims that its stability is greater.

WECKER (311) washes out the anterior chamber with eserine—0.25 % salicylate of eserine: 4 % boiled solution of boracic acid—by lifting the corneal flap with a capsule-forceps. Then he applies a boracic-acid bandage which he has previously moistened with a ½ % solution of eserine.

IV.—ANATOMY.

GENERAL AND COMPARATIVE ANATOMY; IRIS.

312. RADZISZEWSKI. Observation d'anophthalmie avec hernies bilatérales congenitales du cerveau. *Rec. d'ophth.*, Aug., 1886, No. 8.

In a child two months old, RADZISZEWSKI (312) found the orbital cavities entirely empty, lined with normal mucous membrane

and palpable to the optic foramen. In both fissuræ orbitales inferiores he observed an unchanging, white, incompressible tumor covered with conjunctiva, which on incision proved to be a cerebral hernia.

313. HAENSELL. Le microtome et ses applications à l'anatomie de l'œil. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, July–Sept., 1886.

314. DOSTOJEWSKI. Contribution to the question of the existence of a muscle dilating the pupil in mammals. *Wratsch*, 1886, No. 36.

DOSTOJEWSKI (314) examined a large number of thin sections of the iris of man and various animals, which led him to the following conclusions: (1) The membrana Bruchii auctorum is not a transparent membrane free from nuclei, but consists of peculiar fibres, between which are embedded oblong nuclei. (2) The nuclei correspond to cells possessing all the attributes of smooth muscular fibres and not differing from them morphologically in any respect. (3) These fibres are contained only in the posterior limiting layer. The dilatator is arranged in radiating striæ extending from the periphery to the sphincter, into which it merges, spreading out like a fan. The dilatator is very clearly defined in phoca vitulina and lutra vulgaris, where it and the sphincter form the whole mass of the iris. The fibres are almost entirely absent. In ruminants and solipeds the mass of fibres containing the muscles is better developed, while the muscles themselves are weaker. The irides of man, the baboon, mandril, and macacus occupy a position between these two groups. In the lion and leopard the dilatator is well developed. HIRSCHMANN.

V.—PHYSIOLOGY.

a.—GENERAL AND COMPARATIVE PHYSIOLOGY.

315. LANG and BARRETT. The refractive character of the eyes of mammalia. *Royal London Ophth. Hosp. Rep.*, vol. xi., July, 1886.

LANG and BARRETT (315) have examined the refraction of the eyes of various animals. Of 52 rabbits 36 were hyperopic and astigmatic. In the astigmatic eyes the horizontal meridian was generally the least curved. The power of accommodation seems to be very feeble in these animals. In guinea-pigs one eye was hyperopic, sixteen were hyperopic and astigmatic, three myopic and

astigmatic, two had mixed astigmatism. The horizontal meridian had the least degree of curvature; as in rabbits, there was no latent hyperopia. The eyes of mice are generally hyperopic. Eight rats had hypermetropia, three H with astigmatism, one a low degree of myopia, and one mixed astigmatism. The horizontal meridian had the least degree of curvature. Nine cows had hyperopia, four H with astigmatism, one a low degree of myopia. Cats are generally hyperopic, dogs slightly hyperopic or myopic.

316. Beljarminow. Application of the graphic method to investigation of the intraocular pressure. *Russkaya med.*, Nos. 21–23. Dissertation 1886, St. Petersburg.

317. Charpentier. Expériences sur la marche de l'adaptation rétinienne. *Arch. d'ophth.*, vol. vi., July, Aug., 1886.

318. Du Bois-Reymond. Visual unity and the smallest visual angle. *Arch. f. Ophth.*, vol. xxxii., 3.

319. Donders. On stereoscopy by difference in colors. *XVIIIth Meeting of the Ophth. Soc. at Heidelberg*, 1886, p. 82.

320. Exner. On aniso-dioptric cylinders. *XVIIIth Meeting of the Ophth. Soc. at Heidelberg*, 1886, p. 49.

321. Fêre. Influences dynamogènes des excitations visuelles. *Soc. de biol.*, *séance* July 24, 1886.

322. Kahn. Étude clinique sur le champ de fixation monoculaire. *Arch. d'ophth.*, vol. vi., No. 5, 1886. *Thèse de Paris*, 1886.

323. Koller. A peculiar kind of dioptric images. A contribution to the theory of cylindrical lenses. *Arch. f. Ophth.*, vol. xxxii., 3.

324. Philipsen. Undersögelsen af fiets klarhedssans. *Hospitalstidende*, Nos. 33 and 34.

The somewhat complicated apparatus of Beljarminow (316) consists of a combination of Schulten's manometer with a photographic apparatus. Between the manometer and the canula, which is introduced into the eye to be examined, there is a tube filled with a decoction of sandal, or brazil-wood, or campeche wood, and containing an air-bubble, the position of which is affected by the intraocular pressure. The movements of the air-bubble are photographed as a dark curve upon a strip of paper revolving with a speed which can be regulated. The details cannot be related in a review.

The apparatus makes it possible to obtain objective and accu-

rate curves of the temporal dependence of the intraocular pressure on various, even physiological, influences—for instance, pulse, respiration, etc. The author has made examinations of twenty-seven cats'-eyes (seventeen animals), and obtained the following results: (1) There is no difference between the pressure in the anterior chamber and in the vitreous. (2) The curves of the intraocular pressure and that in the blood-vessels are the same only when no influence upon the vasomotor nerves of the eye (sympathetic, fifth nerve) has been exercised (in stronger or weaker action of the heart, respiration, engorgement of the blood-vessels and blood-letting, checked outflow, contractions of the muscles, etc.). (3) When the changes in the blood pressure depend upon causes which at the same time change the tonus of the ocular blood-vessels (irritation of the central end of the sciatic, plexus brachialis, etc.), the increase of the intraocular pressure occurs later and more slowly, the maximum lasts longer, and the return to the normal is slower than the same phases of the blood pressure. (4) The parallelism is still more disturbed when the vasomotors of the eye alone are irritated (irritation of the sympathetic, the ganglion supremum, the fifth nerve, in local application of nicotine, eserine, nitrate of silver, etc.). (5) Irritation of the cephalic end of the sympathetic produces a typical curve: a rapid increase, followed by a rapid decrease. From the beginning of the irritation to the commencement of the increase, 0.58 seconds elapsed on an average. (6) Irritation of Gasser's ganglion produces various curves, according to the point at which the irritation takes place. (7) Intracranial irritation of the oculomotor nerve produces a brief slight increase of the intraocular pressure, which returns to the normal as soon as the irritation ceases. (8) There is no constant causal connection between the movements of the pupil and the intraocular pressure; dilatation as well as contraction of the pupil may be accompanied with increase or diminution of the intraocular pressure. (9) The normal differences in pressure due to the respiration do not exceed 1–2 *mm* pressure of mercury. In a forcible expiration the pressure increases to 30 *mm*; in a deep inspiration it falls 3–8 *mm* below the normal. (10) The differences due to the pulse usually amount to ½–2 *mm*; when the intraocular tension is great the difference is also greater, and may reach 3–5 *mm*. The author thinks that the method may also be used in determining the pressure in the cranium, the bones, the uterus, etc.

HIRSCHMANN.

CHARPENTIER (317) has found, as Aubert did before him, that the sensibility to light at first rapidly increases in the dark, but then more and more slowly. It is of practical importance to observe that after a stay of fifteen to twenty minutes in the dark the sensibility to light is 150–200 times greater than in a room under ordinary illumination. v. MITTELSTÄDT.

KAHN (322) reports the results of his investigations of the field of fixation, made at Landolt's clinic and according to his method (*cf. Arch. d'ophth.*, vol. i., No. 7, Dec., 1881, p. 586), with a review of 45 cases operated for strabismus. The investigations are on eyes with or without anomalies of refraction, strabismus, paralysis, take into consideration the relation of convergence to the field of fixation, and show the influence of advancement and tenotomy on the former.

b.—IRIS AND ACCOMMODATION.

325. BUCHHOLZ. The effect of a series of physical and chemical influences on the sphincter of the iris. *Inaug. Diss.*, Halle, 1886.

c.—RETINA AND CENTRAL ORGAN.

326. v. GUDDEN. The question of localizing the functions of the cortex of the cerebrum. *Zeitsch. f. Psych.*, vol. xlii. Gudden removed one or both eyes of new-born animals, and subsequently found no atrophy of the cortex of the occipital lobe. This fact he utilizes in denying the existence of Munk's visual centre.

d.—COLORS.

327. CHARPENTIER. Faits complémentaires rélatives à l'intensité des sensations lumineuses. *Arch. d'ophth.*, vol. vi., No. 4.

328. DOBROWOLSKY. The sensibility of the normal eye for shades of color in the periphery of the retina. *Wöchentl. klin. Ztg.*, 1886, Nos. 21 and 22.

329. GLAN. A fundamental law in regard to complementary colors. *Arch. f. d. ges. Physiol.*, vol. xxxix., 1.

As CHARPENTIER (327) has shown in a previous paper the apparent brightness of the more refrangible colors diminishes less in decreasing illumination than that of the less refrangible. The author tested with his photometer the influence which diminution of the size of the colored object or its retinal image respectively has upon the apparent intensity of the color. Green, red, blue,

and yellow may seem equally bright when their retinal image is of a certain size ; but this equality disappears when the size of the retinal image decreases, the diminution in brightness being most marked in the more refrangible colors, while the decrease in brightness due to diminishing the illumination affects the less refrangible colors more.

DOBROWOLSKY (328) found, as König and Dieterici did, that the parts of the spectrum affecting his eye most were near the lines D, F, and G. He obtained the following results : The sensibility for differences in the shades of color is greatest for all colors of the spectrum at the centre, and gradually diminishes towards the periphery until it entirely disappears. Even 1° only to one side of the point of fixation, the sensibility is perceptibly less. The loss of sensibility occurs sooner (*i. e.*, less peripherically) in colors the perceptibility of which at the centre is less. The boundary line of red, for instance, lies nearest the centre, that of green (the centre is more sensitive to green than red) more peripheric. Red is not perceived beyond 50° on the inner half of the retina and 35° on the outer half, green not beyond 80° and 50° respectively, blue and yellow not beyond 90° and 65° respectively.

According to GLAN (329) the intensity of all complementary colors, which when combined produce the same quantity of white, is the same for all in the sensitive layer of the macula lutea.

Sections VI.–XI. reviewed by Dr. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

330. H. COHN. New examinations of the eyes of watchmakers. *Tugebl. d. Naturforscher-Versamml. zu Berlin*, 1886., p. 391.

331. KNIES, M. Myopia and its treatment. *Bericht d. Ophth. Ges. zu Heidelberg*, 1886, p. 26, and *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 236.

332. MARTIN. Études sur les contractions astigmatiques du muscle ciliaire. *Ann. d'ocul.*, vol. xcvi., p. 1.

333. NETTLESHIP. Myopia from childhood. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 73.

334. SCHNELLER. The origin and development of myopia. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 245. *Tageblatt d. Naturforscher-Versamml. zu Berlin*, 1886, p. 390.

335. Weiss, L. The influence of tension of the eyelids on the curvature of the cornea and thus upon the refraction of the eye. *Bericht d. Ophth. Ges. zu Heidelberg*, 1886, p, 76 (*v.* these Arch., vol. xvii., p. 63, Ger. Ed.).

Martin (332) discusses partial contraction of the ciliary muscle, which corrects corneal astigmatism. There are two kinds: (1) one which remains when the correcting glass is placed before the eye, and (2) one which disappears when this is done.

Marckwort.

VII.—LIDS.

336. Daguillon. Eczéma palpébral à la suite de l'opération de la cataracte. *Bull. de la clin. nat. ophth.*, vol. iv., 3, p. 132.

337. Dumont. Corps étrangers du cul-de-sac de la paupière supérieure droite. Iridochorioidite. *Bull de la clin. nat. ophth.*, vol. iv., 3, p. 137.

338. Gilmore, A. P. Symblepharon of the lower lid. *Chicago Med. Jour. and Exam.*, May, 1886.

339. Griffith, A. H. Syphilitic lesions of the eyelids. *Med. Chron.*, June, 1886, p. 193.

340. Richet. Ectropion cicatriciel de la paupière supérieure droite; blépharorrhaphie; guérison. *Rec. d'ophth.*, 1886, No. 9, p. 517.

341. Schöbl. Chancroid of the lid of lymphoid origin. *Tagebl. d.* 59. *Naturforscher-Versamml. zu Berlin*, 1886, p. 389 (*v.* these Arch., vol. xvii., p. 215, Ger. Ed.).

Dumont (337) saw iridochoroiditis develop in the eye of a man suffering with arthritis, five days after a grain of oats had lodged in the upper fornix. The foreign body was removed and the patient soon recovered under proper treatment.

v. Mittelstädt.

Griffith (339) describes 21 cases of ulceration of the lids, not only due to primary chancre or secondary or tertiary affections, but also the conditions closely resembling primary chancre, but not accompanied with undoubted syphilitic symptoms. In nine of these cases primary infection had taken place; the ulcer was indurated, and the lymph glands were swollen. The ulcer was always situated near the margin of the lid and extended into the mucous membrane; in only one case it was found on the inner surface of the upper lid.

Richet (340) publishes a paper on the operation of cicatricial

ectropium of the upper lid, and calls particular attention to the necessity of performing blepharoraphia at the same time.

MARCKWORT.

VIII.—LACHRYMAL APPARATUS.

343. ARMAIGNAC, H. Dacryoadénite aiguë terminée par suppuration. *Rev. clin. d'ocul.*, 1886, No. 7, p. 156.

344. BOCK, E. Contribution to the pathological anatomy of the caruncle. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p, 487.

345. GALEZOWSKI. Inflammation des deux glandes lacrymales. *Rec. d'ophth.*, 1886, No. 7, p. 415. Description of a case.

346. PETROLACCI, F. De l'epiphora ataxique. *Thèse de Montpellier*, 1886.

ARMAIGNAC (343) observed acute inflammation of the lachrymal gland from its beginning, when it was still possible to feel the inflamed gland and thus make a correct diagnosis of this rare affection. As soon as fluctuation was noticed, an incision was made and the pus allowed to escape. The wound, which soon discharged a clear, lemon-colored liquid, healed rapidly, but the swelling of the gland lasted several weeks. v. MITTELSTÄDT.

BOCK (344) removed from the lachyrmal caruncle of the left eye of a student a tumor the size of a pea, which he considered a hyperplasia of that organ ; it was remarkable for the development of very vascular connective tissue and a few small lobes of fat.

IX.—MUSCLES AND NERVES.

347. CANT, W. J. Paralysis of external recti. *Ophth. Soc. Unit. Kingd.*, July 2, 1886.

348. GRAEFE, A. Contributions to the knowledge of the influences active in developing and checking strabotic deviations, with especial consideration of hyperopic strabismus and muscular asthenopia. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., p. 223.

349. KALT, E. Recherches anatomiques et physiologiques sur les opérations du strabisme. *Arch. d'ophth.*, vol. vi., 4, p. 323, and No. 5, p. 430.

350. KNAPP, H. Advancement of Tenon's capsule in strabismus. *Amer. Ophth. Soc.*, July 21–22, 1886. Recommends Wecker's operation from personal experience.

351. MAUTHNER, L. The non-nuclear paralyses of the ocular muscles. Wiesbaden, 1886, J. F. Bergmann.

352. NETTLESHIP, E. Unsymmetrical nystagmus. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 76.

353. SALTERAIN. De l'électricité en thérapeutique oculaire. *Rec. d'ophth.*, 1886, p. 544.

354. THEOBALD, S. The amblyopia of squinting eyes ; is it the determining cause or a consequence of the squint? *Amer. Ophth. Soc.*, July 21–22, 1886.

355. UHTHOFF, W. Ophthalmoplegia externa. *Tagebl. d. Naturforscher-Versamml. zu Berlin*, 1886, p. 155 (*v.* these ARCH., vol. xvii., p. 211, Ger. Ed.).

CANT (347) observed in a man aged sixty-three complete paralysis of both external recti with diplopia, simultaneously with neuritis and headache. His condition improved after using iodide of potassium.

A GRAEFE (348) believes that the ultimate cause of typical convergent strabismus is abnormal passive shortening of the internal rectus. Such a result is produced when powerful active contraction is demanded, and as hyperopia causes this increased contractile shortening in these cases in which the proper relation between accommodation and convergence is not established, this anomaly of refraction, in accordance with Donders' theory, therefore becomes the prime cause of the development of typical convergent strabismus.

KALT (349) studied the changes produced in the relation of the muscles to the eyeball by the advancement and tenotomy of the muscles, as well as of advancement of Tenon's capsule, in sixteen large dogs (weighing eighty to ninety pounds), as the conditions here resemble those in man. He performed the operations named, and at various times afterwards made an anatomical examination. For details and illustrations *v.* the original. It is worthy of note that after simple division the tendon loses its character and is converted into a small fibrous stump, which attaches itself to the sclera mainly through Tenon's capsule and its sheaths surrounding the muscles, while the other adhesions are much weaker, but may extend far backward between the muscle and sclera, even to the entrance of the optic nerve. As in advancement the union between muscle and sclera is brought about through Tenon's capsule, it is necessary to pass the needles through the latter as far back as possible, to increase the effect

and prevent the sutures from tearing out. If this takes place, the newly formed tendinous tissue attaches itself close to the corneal margin, but is very much elongated, the action of the muscle being diminished instead of increased. The advancement of the capsule can be demonstrated anatomically, a fibrous band being found which connects the muscle with the circumcorneal tissue and is shorter than the tendon, which may be folded. If the leaf of Tenon's capsule lying under the tendon be seized, the latter can easily be drawn forward. V. MITTELSTÄDT.

MAUTHNER (351) discusses, in the thirteenth number of his ophthalmological lectures, the paralyses of the ocular muscles not of nuclear origin. He first treats of intracranial, cerebral, cortical, and fascicular paralyses, then intracranial paralyses located at the base. To the latter class belong the relapsing paralysis of the oculomotor nerve, the binocular, curable, total paralysis of the ocular muscles, the binocular paralysis of one motor nerve, the one-sided progressive paralysis of the cerebral nerves, the binocular progressive paralysis of the cerebral nerves, and the paralysis of the oculomotor nerve accompanied with contra-lateral hemiplegia. Orbital paralyses are due to inflammation of the retro-ocular tissue, to periostitis of the orbit, or tumors of the latter. The peripheric paralyses may be due to syphilis, tuberculosis, diphtheria, diabetes mellitus, acute rheumatism of the joints, toxic influences, and injuries.

SALTERAIN (353) reports a case of right-sided spasm of the orbicularis, cause unknown ; the constant current made it worse, the induced better. He also reports a case of binocular hysterical amblyopia, which he cured in three days with atropine, iodide of potassium, and the constant current. MARCKWORT.

X.—ORBIT AND NEIGHBORING CAVITIES.

356. CARL, DUKE IN BAVARIA. Communication of a case of orbital tumor. *Wiener med. Presse*, 1886.

357. DAVIDSON, DYSE. Meningitis after enucleation. *Ophth. Soc. Unit. Kingd.*, June 8, 1886.

358. DEEREN. Exophthalmie double. *Rec. d'ophth.*, 1886, No. 6, p. 337.

359. GALEZOWSKI. Exophthalmie monoculaire avec amaurose sans lésion ophthalmoscopique. *Rec. d'ophth.*, 1886, No. 9, p. 513.

360. HAASE. Pulsating exophthalmus of the right eye, cured by ligating the common carotid. *Arch. f. Augenhk.*, vol. xvii., p. 25.

361. MAGNUS, H. Exophthalmus and diplopia due to empyema of the right frontal sinus. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 494.

362. RENTON, J. E. Notes on cases of cerebral abscess subsequent to orbital periostitis. *Ophth. Rev.*, vol. v., Nos. 57 and 58, p. 206.

363. SNELL, S. Case of orbital nævi treated by electrolysis. *The Lancet*, July, 1886, p. 163.

364. WIESNER, B. The lymphangioma of the orbit. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 2, p. 205.

CARL, DUKE IN BAVARIA (356) observed at the upper inner angle of the left orbit a tumor which had existed six years, and after an injury received two years ago had grown to the size of a hazel-nut, and was of bony hardness. The eye, possessing perfectly good sight, was dislocated outwards, downward, and forward ; its mobility was somewhat limited. After breaking the bony shell a yellowish substance escaped. As the secretion did not cease, the bony projection was entirely chiselled away. The patient rapidly recovered, and only slight deviation of the globe and diplopia remained.

DAVIDSON (357) enucleated an eye under antiseptic precautions three years after an injury, on account of painfulness. Meningitis began twenty-four hours later, and the patient died after three days. The autopsy showed meningitis and catarrhal inflammation of the uterus. Davidson makes the bold assumption that the pyæmic infection had its source in the uterus.

DEEREN (358) publishes a case of lateral exophthalmus, which he attributes to a local acute meningitis. MARCKWORT.

GALEZOWSKI (359) reports a case of unilateral exophthalmus with amaurosis, without any ophthalmoscopic changes. As iodide of potash occasionally had a good effect, he thinks the affection may have been due to a syphilitic exostosis at the optic foramen. MARCKWORT.

The case of MAGNUS (361) was that of a woman aged sixty-three, in whom exophthalmus combined with diplopia had developed, in consequence of empyema of the right frontal sinus. After chiselling out a piece of the somewhat bulging wall of

the frontal sinus of about the size of a silver quarter, a large quantity of pus escaped. The mucous membrane lining the sinus was scraped off, the cavity syringed out with a solution of carbolic acid, and a tampon of iodoform gauze inserted. The patient made a rapid recovery, and the exophthalmus and diplopia disappeared.

RENTON (362) observed in a boy aged twelve an abscess of the right frontal lobe, due to periostitis and necrosis of the roof of the right orbit.

WIESNER (364) publishes a case of lymphangioma of the orbit, in which the clinical diagnosis of fibroma had been made. The characteristics of the cavernous lymphangioma were first revealed under the microscope. These tumors are due to the presence of embryonic cellular tissue, and differ from typical angioma by the absence of the characteristic increase and decrease in size.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

365. Andrews. The frequent instillation of a two-per-cent. solution of nitrate of silver in purulent ophthalmia. *Amer. Ophth. Soc.*, July 21–22, 1886.

366. COUTURIER. De l'ophthalmie phlycténulaire. *Prog. méd.*, 1886, No. 34, p. 699.

367. DOBROTWORSKY. The development of trachoma among soldiers, dependent upon their quarters. *Wojeno-sanit. Djelo*, 1886, No. 30.

368. FRYER. The use of hot water in some of the corneal and conjunctival inflammations. *Amer. Ophth. Soc.*, July 21–22. 1886.

369. ISKERSKY. The prevention of trachoma among soldiers. *Wojeno Med. Jour.*, April, 1886.

370. MINOR, JAS. Boric-acid powder in the treatment of granular lids. *N. Y. Med. Jour.*, vol. xliv., No. 4, p. 122.

371. RODIONOW. The etiology of phlyctenular conjunctivitis. *Wojeno-sanit. Djelo*, 1886, No. 33.

372. STÖLTING. Tuberculosis of the conjunctiva. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 225.

373. ZIEMINSKI. De l'ophthalmie croupale, quelques remarques sur la scrofulose en général et les scrofulides de l'appareil visuel. *Rec. d'ophth.*, 1886, No. 9, p. 529.

ANDREWS (365) instils a two-per-cent. solution of nitrate of silver four or five times daily in purulent ophthalmia.

DOBROTWORSKY (367) concludes from his observations, which he continued in two regiments for several years, that the living together of many soldiers, even in large, airy quarters, or in camp, in large barracks, contributes much to the development and aggravation of trachoma and acute catarrhs. By putting a few soldiers together, even into small rooms, the number of affections is much diminished, even under unfavorable circumstances, such as dampness or small cubic contents of the room. HIRSCHMANN.

FRYER (368) recommends hot water, as hot as it can be borne.

ISKERSKY (369) makes the following assertions in his voluminous, somewhat polemic, paper: (1) Trachoma is the most obstinate, widespread disease among our soldiers; (2) it is infectious, and (3) it spreads through infection, never spontaneously; (4) it is introduced by recruits and imparted to the soldiers, who in turn spread it among the population. The following measures should therefore be adopted to prevent it: (1) Men affected with trachoma should not be accepted as soldiers; (2) those already in service should be completely isolated. HIRSCHMANN.

RODIONOW (371) observed in the otherwise healthy soldiers of the 12th grenadier regiment, while in camp, an epidemic of phlyctenulæ after heavy rains. He supposes that the development of a specific phlyctenula-bacterium may be the cause of the epidemic. HIRSCHMANN.

STÖLTING (372) reports that in three cases of tuberculosis of the conjunctiva, in which the presence of tubercle bacilli was proven, the tuberculous masses were removed and the base was cauterized with a sharp stick of lapis purus or the thermo-cautery wherever there were any suspicious points. Recovery ensued in all cases, in one of them not until after repeated applications of the method.

According to ZIEMINSKI (373) croupous conjunctivitis is a complication which develops in the course of an inflammation of the conjunctiva. It complicates purulent as well as conjunctivitis of scrofulous origin. MARCKWORT.

374. BEHME. The application of the galvano-cautery in a beginning partial staphyloma. *Inaug. Diss.*, Greifswald. 1886.

375. BOCK, E. Contribution to the pathological anatomy of the cornea. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 443.

376. BRAILEY, W. Interstitial keratitis. *Ophth. Soc. Unit. Kingd.*, July 2, 1886.

377. BRUGGER, RICHARD. An anatomical contribution to the knowledge of keratitis bullosa. *Inaug. Diss.*, Munich, 1886.

378. GOLDZIEHER. The galvano-cautery in diseases of the eye. *Wiener med. Presse*, 1886, Nos. 23–26.

379. GROSSMANN, L. Galvano-cautery as a powerful antiseptic in destructive corneal processes. *Wiener med. Presse*, 1886, Nos. 25, 27, and 28.

380. KRÜGER. The treatment of the serpent ulcer of the cornea with the glowing iron. *Inaug. Diss.*, Kiel, 1886.

381. SCHÖBL. A subepithelial carcinoma of the cornea. *Tagebl. d.* 59. *Naturforscher-Versamml. zu Berlin*, 1886, p. 389 (*v.* these ARCH., vol. xvii., p. 215, Ger. Ed.).

BEHME (374) recommends the galvano-cautery in beginning partial staphyloma at the point of perforation of the cornea.

BOCK (375) reports a peculiar case of formation of vesicles on the cornea.

BRAILEY (376) describes a case of interstitial keratitis, in which he found a number of grayish-white nodules in the cornea, which he considers tuberculous.

BRUGGER (377) examined a case of marked keratitis bullosa in absolute glaucoma. On the cornea were one large and several small vesicles, situated in or under the epithelium. The smaller ones were produced by the destruction of single epithelial cells, the larger ones by the confluence of several smaller ones. Bowman's membrane was perforated at points corresponding to the vesicles, the corneal parenchyma was infiltrated and loosened, and the epithelium of Descemet's membrane in process of destruction. The vesicles are the result of destruction of the epithelial cells, not of the swelling and dilatation of the intercellular spaces by the œdema of the cornea.

GOLDZIEHER (378) uses the galvano-cautery in all kinds of corneal ulcers, in follicular infiltration of the conjunctiva, in trachoma and trachomatous pannus.

GROSSMANN (379) recommends the galvano-caustic treatment in traumatic keratitis, serpent ulcer, rodent ulcer, scrofulous ulcers, pannus with ulcers, and in frenum phlyctænulare. He uses a delicate platinum loop, which he brings only to a red heat. In deep ulcers he produces a perforation with the loop. The

after-treatment consists in the use of atropine, eserine, insufflation of iodoform, and a protective bandage.

KRÜGER (380) reports that Völkers uses a simple glowing iron as a cautery in serpent ulcer.

382. ROBINOWITSCH, H. A case of cysticercus in the anterior chamber. *Wjestnik. ophth.*, 1886, No. 3, p. 196.

Sections XII.–XXI. reviewed by DR. NIEDEN.

XII.—IRIS.

383. COUTURIER. De l'iritis dans les Vosges. *France méd.*, Aug., 1886.

384. CROSS. Cystic tumor of the iris. *Ophth. Soc. Great Brit.*, 1886, p. 67.

385. HIRSCHBERG, J. On serous cysts of the iris. *C. f. A.*, vol. x., p. 262.

386. JESSOP. Tubercle of the iris and choroid. *Ophth. Soc. Great Brit.*, 1886, p. 55.

387. KRÜCKOW, A. Primary melanosarcoma of the iris. *Wjestnik. ophth.*, May–June, 1886.

388. NETTLESHIP. Syphilitic iritis in an old glaucomatous eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 64.

389. NETTLESHIP. New formation of pigment on the front of the iris. *Ophth. Soc. Great Brit.*, 1886, p. 66.

COUTURIER (383) reports on 17 cases of serous iritis, and concludes from them that this affection is due not only to syphilis, but frequently also to scrofula. MARCKWORT.

CROSS (384) observed a cystic tumor of the iris, which was first noticed two years and nine months before he saw the patient. It enlarged for a year, and then subsided to the size of a pinhead. It again enlarged with redness and pain, and then became about the size of a pea. Subsequently the eye became perfectly quiet. FITZGERALD.

In an eye in which an iridectomy had been performed on account of glaucoma, and in which a large clear cyst of the iris had formed in the inner lower quadrant, filling the whole anterior chamber to the periphery, HIRSCHBERG (385) made a section with a Graefe knife at the corneal margin 7 *mm* long, perforating the wall of the cyst at the same time. Then he introduced a curved forceps, seized a piece as large as possible of the anterior

wall of the cyst, with the iris tissue adhering to it, and abcised it. The result was good.

JESSOP (386) showed sections of the eye of a rabbit artificially inoculated with tubercle. The bacilli were cultivated on serum. In three weeks after injection into the anterior chamber there were well-marked tubercular deposits on the iris. The whole body showed signs of general tuberculosis. The animal lived 66 days. FITZGERALD.

KRÜCKOW'S (387) case was that of a young woman aged twenty-eight. In the right eye there was $M = \frac{1}{36}$, $V = \frac{1.2}{10}$. Fundus normal. The upper outer quadrant of the iris had been converted into a dark-brown, slowly growing tumor, which filled one half of the pupil and was in contact with the posterior surface of the cornea. The patient says that she noticed a black spot ten years previously at the location now occupied by the tumor. Four months ago the author saw a severe hemorrhage into the anterior chamber. The tumor was successfuly removed and proved to be a melanosarcoma. HIRSCHMANN.

NETTLESHIP'S (388) case was that of a man who had syphilitic iritis of both eyes. In the right an iridectomy had been performed five or six years before for glaucoma. The case is one of interest as showing that an acute inflammation from a constitutional cause may attack an iris which is probably somewhat atrophied. FITZGERALD.

NETTLESHIP (389) saw the greater part of the front of the iris covered by a layer of dark reddish-brown pigment which entirely covered the inner circle of the iris, but even peripherically its outline was irregular. The patient was forty-three years old, and had had this eye operated on for cataract when twenty-one. It was very badly inflamed for two months afterwards.

FITZGERALD.

XIII.—CHOROID.

390. STEINHEIM, B. Anophthalmus dext. Coloboma iridis et chorioideæ sin. *C. f. A.*, 1886, p. 201.

STEINHEIM (390) observed in a girl nine months old anophthalmus dext., and in the left eye a coloboma of the iris lying in the horizontal meridian with the apex inwards, associated with a coloboma of the choroid including the whole papilla. There was no perception of light. There was no consanguinity of the parents. The three older children had normal eyes.

XIV.—GLAUCOMA.

391. BIRNBACHER, A., and CZERMAK, W. Contributions to the pathological anatomy and pathogeny of glaucoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 2, p. 1, and 3, p. 1 ff.

392. JAVAL. On glaucoma. Report of cases. *Sitzungsber. d. Heidelb. Ophth. Ges.*, 1886, vol. xxiii., p. 156 (*cf.* these ARCH., vol. xvii., p. 212, Ger. Ed.).

393. NETTLESHIP. Syphilitic iritis in an old glaucomatous eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 64.

BIRNBACHER and CZERMAK (391) present a detailed study of the pathological anatomy and pathogeny of glaucoma based on the anatomical examination of seven cases. They discuss the changes found, especially the ectasia of the sclera and the excavation of the optic disc. Then follows a description of the experiments on circulation and tension in the eye. For details see the original.

XV.—SYMPATHETIC OPHTHALMIA.

394. BRAILEY. Intraocular sarcoma exciting sympathetic disease. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 53.

395. CHEVALIER. De l'ophthalmie sympathique. *Thèse de Montpellier*, 1886. Recommends enucleation.

396. HUTCHINSON, J. On a blood theory in explanation of reflex ophthalmitis. *Ophth. Soc. Unit. Kingd.*, 1886, p. 71.

397. MILLES. Sympathetic ophthalmitis. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 43.

BRAILEY (394) enucleated an eye afflicted with an intraocular sarcoma, as it was producing sympathetic trouble in the other; the latter subsequently recovered. Brailey considers that it is not the sarcoma itself directly, but the uveitis produced by it, which gives rise to the sympathetic inflammation, and that this case furnishes another example of the favorable influence of the removal of the exciting eye in sympathetic disease. FITZGERALD.

MILLES (397) reports two cases of sympathetic ophthalmitis produced by intraocular sarcoma in the exciting eye. In one of the cases a perforation occurred and Milles suggested that possibly this was the exciting cause. In the other case there was no perforation. He also reports two other cases of sympathetic ophthalmitis, one due to traumatic keratitis in which both eyes had to be excised, the other case was due to extraction of cataract.

FITZGERALD.

XVI.—LENS.

398. CHIBRET. Les indications de l'iridectomie dans l'opération de la cataracte. *Arch. d'ophth.*, vol. vi., No. 4, July–Aug., 1886, p. 355.

399. DEUTSCHMANN, R. Pathologico-anatomical examination of a human zonular cataract. *v. Graefe's A. f. O.*, vol. xxxii., 2, p. 295.

400. DUJARDIN. Deux cataractes molles opérées par aspiration. *Journ. des sci. méd. de Lille*, Aug., 1886.

401. KAZAUROW. The prevention of septic diseases of the eye after cataract-operations. *Wjestnik. ophth.*, July–Oct., 1886.

402. LANDESBERG, M. Rent in the anterior capsule of the lens produced by contusion. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 320.

403. LANDESBERG, M. Clearing up of a traumatic cataract. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 318.

404. MEYHÖFER. Another case of cataract after a stroke of lightning. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 375.

405. MEYHÖFER. Remarks on cataract-operations. *Report of the Ophth. Clinic*, 1884–85, p. 22, 1886.

406. MOTAIS. Observations des cataractes congénitales et traumatiques, traitées par l'aspiration du Dr. Redard. *Gaz. méd. de Paris*, Aug., 1886.

407. ROHMER. Maturation artificielle de la cataracte. *Union méd.*, 1886, p. 298.

408. ROTHZIEGEL (Vienna). The coincidence of cataract and nephritis. *Allg. Wiener med. Ztg.*, 1886, No. 30.

CHIBRET (398) generally makes a small iridectomy in extraction, to prevent incarceration of the iris, secondary cataract, and closure of the pupil. He omits it only in hard cataracts with little cortex and a certain tension of the iris. The coloboma has no optical disadvantages; on the contrary, Chibret found that people who had had an iridectomy performed in one eye and not in the other, saw better with the former eye.

v. MITTELSTÄDT.

DEUTSCHMANN (399) gives us the first microscopical description of a case of incomplete double zonular cataract.

KAZAUROW (401) observes the strictest antiseptic precautions in regard to instruments, field of operation, hands, etc. By

strictly following these rules he has had no suppuration among the last 100 extractions. HIRSCHMANN.

LANDESBERG* (402) observed after a perforating wound and a rent in the anterior capsule of the lens, absorption of the escaped masses of lens, closure of the opening in the capsule, and, within seven weeks, a clearing up of the opaque masses of cortex lying near the edge of the wound. With a weak convex cylindrical glass V = $\frac{1}{15}$.

After a severe blow upon the eye, LANDESBERG (403) saw a rent in the capsule of the lens 6 *mm* long, the cortex become opaque throughout the extent of the wound, and disappear by absorption after the rent in the capsule had closed spontaneously. V = $\frac{1}{15}$ E. The patient was under observation seven years, but no secondary symptoms developed.

MEYHÖFER (404) adds another to the eight cases thus far described of cataract after a stroke of lightning. It was confined to one side, on which the paresis of the limbs and tongue was most marked, and presented itself principally in form of opacities in the anterior and posterior capsule, and very minute dots in the cortex. The fundus was normal.

After describing his method of operating for cataract in detail, MEYHÖFER (405) recommends simple puncture of the anterior chamber followed by energetic massage of the lens, to ripen the cataract.

MOTAIS (406) recommends suction in congenital and traumatic cataract with Redard's apparatus. Three cases.

MARCKWORT.

ROHMER (407) recommends artificial ripening of cataract by division, escape of the aqueous, and massage, and bases his advice on a report of ten cases.

ROTHZIEGEL (408) examined the urine in 102 cases of uncomplicated cataract for albumen, and found traces in 27 cases, small quantities in 27, and large quantities in 2. In 15 the diagnosis of Bright's disease was made ; they had all passed their fiftieth year.

XVII.—RETINA AND FUNCTIONAL DISTURBANCES.

409. BETTREMIEUX, P. Décollement de la rétine et iridectomie. *Arch. d'ophth.*, vol. vi., 5, Sept.–Oct., 1886, p. 459.

410. NETTLESHIP. Central chorio-retinitis in one eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 76.

411. NETTLESHIP. Albuminuric retinitis coming on during pregnancy. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 67.

412. NETTLESHIP. On the pathological changes in syphilitic choroiditis and retinitis. *Ophth. Hosp. Rep.*, vol. xi., 1, 1886.

413. NETTLESHIP. Commotio retinæ. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 59.

414. v. REUSS. Congenital anomalies of the retina and optic nerve. *Wiener med. Presse*, No. 9 ; *C. f. A.*, vol. x., p. 287.

415. UHLE. Amblyopia after a stroke of lightning. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 379.

BETTREMIEUX (409) recommends iridectomy in recent cases of detachment of the retina, basing his views upon recent statistics of Dransart, who in sixteen cases had 68 % of cure, and has had some patients six years under observation without a relapse. The author himself operated four cases, and succeeded in two. How the iridectomy acts can only be surmised. v. MITTELSTÄDT.

NETTLESHIP'S (410) patient while shooting at Wimbledon in a hot sun noticed in the evening that every thing looked reddish with the left eye. The day after his return home a black spot came before the eye. V about the same in both, the region of the macula darker in the left than in the right. Several small pigment collections lying upon palish spots about circumference of macula with fine whitish stippling about the fovea centralis. Nettleship thinks, notwithstanding the asymmetry of the disease, that it was caused by the exposure to the strong sunlight.

FITZGERALD.

In NETTLESHIP'S (411) second case the retinitis occurred in a woman in an advanced stage of pregnancy. Premature labor was induced, and in a few weeks the patient had regained her health and the eyes had greatly improved. FITZGERALD.

NETTLESHIP (412) gives a minute account of the pathological changes he has found in choroid and retina, with drawings of the microscopic preparations, together with the clinical history of the cases from which they are taken. He considers that the opinion held by Prof. Förster, viz., that the retinitis in syphilis is for the most part a consequence of the choroiditis, and the rival opinion of Dr. Ole Bull, viz., that the choroiditis is, as a rule, secondary to the retinitis, are both too absolute, and that there are cases to prove that neither is universally true. FITZGERALD.

NETTLESHIP'S (413) patient was struck on the eye with a cricket ball. Round the macula there was a well-marked, radiating,

watered-silk appearance. This Nettleship states is by no means uncommon in children after blows upon the eye. In another case he reports it remained permanently. FITZGERALD.

v. REUSS (414) reports a peculiar ophthalmoscopic appearance of the fundus in a girl suffering with progressive atrophy of one side of the face. It was covered with numerous bright, round dots, which by their confluence formed the most peculiar figures. Only a narrow zone around the optic nerve was free from the dots, while in the periphery they were less developed. The dots were of a reddish-yellow color, and the retinal blood-vessels passed over them. There were no disturbances of vision; the dots were probably the result of fine congenital changes in the pigment epithelium.

UHLE (415) describes a case of anæmia of the optic nerve and retina due to a stroke of lightning. It was observed in the right eye of a young girl, and for three weeks afterwards the papilla appeared perfectly white, while the central blood-vessels were very much contracted. From the fact that after the inhalation of nitrite of amyl and the use of eserine, on account of the widely dilated pupil, V rose to $\frac{20}{20}$ and the ophthalmoscopic appearance became normal, Uhle concludes that the anæmia was due to the continued irritation of the sympathetic nerve.

XVIII.—OPTIC NERVE.

416. DESPAGNET. Les injections hypodermiques de cyanure d'or et de potassium. *Rec. d'ophth.*, 1886, p. 548.

417. DUMONT. Atrophie papillaire, suite de névro-rétinite albuminurique. *Bull. de la clin. nat. ophth.*, vol. iv., No. 4, p. 142.

418. LANDESBERG, M. Neuritis retrobulbaris periph. acuta oc. dext. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 316.

419. NETTLESHIP. Atrophy of one optic nerve after papillitis from erysipelas affecting orbit during convalescence from scarlet-fever. Cellulitis had probably extended from erysipelas of the face. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 65.

420. v. REUSS. Congenital anomalies of the optic nerve. *Wiener med. Presse*, No. 9, ff.

421. WEILAND, A. Retrobulbar neuritis after erysipelas of the face. Recovery. *Deutsche med. Wochenschr.*, No. 39, 1886.

422. ULRICH. On choked disc. *Sitzungsber. d. Heidelb. ophth. Ges.*, 1886, vol. xvii., p. 93.

DESPAGNET (416) again recommends subcutaneous injections of cyanide of gold and potassium, but is strenuously opposed to injections of strychnine. MARCKWORT.

LANDESBERG (418) reports a case of acute retrobulbar neuritis of rheumatic origin, which he observed in a girl aged seventeen. The acute pain on movements of the globe, the normal appearance of the fundus, and the rapid recovery, in nine days, by the use of iodide of potassium, were characteristic of the affection.

v. REUSS (420) describes a congenital peculiarity of color of the optic nerve, the latter being of a dark grayish red, but the nerve fibres transparent; the blood-vessels were edged with white shining tissue, which formed a stellate plate at the centre of the papilla.

WEILAND (421) describes a case of total amaurosis of the right eye after erysipelas of the same side of the face, accompanied with indistinctness of the papilla and contraction of the blood-vessels. Sight was perfectly restored in two weeks after diaphoretic treatment. The case was probably one of neuritis retrobulbaris, though the eyeball was not sensitive to pressure and movements caused no pain.

ULRICH (422) reports on three cases of tumor of the brain in which he could observe the beginning and development of choked disc. The autopsy showed œdema of the optic nerve and compression of the central blood-vessels. It was probably only a secondary œdema in direct connection with the œdema of the brain.

XIX.—INJURIES (FOREIGN BODIES) AND PARASITES.

423. DUMONT. Rupture de la sclérotique, enclavement de l'iris dans la plaie. Guérison. *Bull. de la clin. nat. ophth.*, vol. iv., 3, p. 143.

424. FRANKE, E. On rents in the sphincter of the iris, with remarks on the mechanics of rupture of the choroid. *v. Graefe's Arch. f. Ophth.*, vol. xxii., p. 261.

425. v. MOLL. On wounds in the ciliary region. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 299.

FRANKE (424), before describing his case of rents in the sphincter of the iris combined with double rupture of the choroid, briefly relates the twelve cases thus far reported, and adds the views of the different authors in regard to the pathogeny of this

injury. In Franke's case there were eight rents 1 *mm* long at the pupillary margin; one went through the macula, and another parallel one was situated between the macula and papilla. Franke attributes the rupture to the stretching of the choroid, which ends at the papilla, and in consequence of its increased strength at that point can only tear at some distance from the papilla. The stretching of the choroid is due to a change in the shape of the globe produced by the blow, and to the pressure of the vitreous acting from within outward.

In accordance with the latest views on sympathetic ophthalmia, v. MOLL (425) favors conservative measures even in extensive injuries in the ciliary region. He quotes four cases which formerly would have been enucleated on account of the extent of the injury and the fear of sympathetic ophthalmia. In three a good result was obtained; one eye had to be enucleated on account of subsequent cyclitis. No sutures were inserted.

XX.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

426. BAAS. A rare sequence to epidemic parotitis. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 273.

427. BADAL. Recherches statistiques sur les manifestations oculaires de la syphilis (suite). *Arch. d'ophth.*, vol. vi., 4, July–Aug., 1886, p. 301.

428. BORTHEN LIJDER. Oftalmomalacie. *Med. Revüe*, Bergen, May, 1886.

429. DUMONT. Rétinite albuminurique chez un diabétique. *Bull. de la clin. nat. ophth.*, vol. iv., No. 3, p. 141.

430. HIRSCHBERG, J. Case of cerebral tumor. *C. f. A.*, vol. x., p. 228.

431. HIRSCHBERG, J. Diabetes in private practice. *C. f. A.*, vol. x., p. 193.

432. KAMOCKI. Pathologico-anatomical investigations of diabetic eyes. *Sitzungsber. d. ophth. Ges. zu Heidelberg*, vol. xviii., p. 102 (*v.* these ARCH., vol. xvii., p. 65, Ger. Ed.).

433. MANDET. Ophthalmie varolique chez un enfant de 15 jours. Cécité consécutive par iridochorioidite; enucléation de l'œil droit. *Jour. des sci. méd. de Lille*, Sept. 18, 1886.

434. NIEDEN, A. Case of dyslexia, with report of autopsy.

Tagebl. d. Naturforscher-Versamml. zu Berlin, 1886, p. 156 (*cf.* these ARCH., vol. xvii., p. 211, Ger. Ed.).

435. OPPENHEIM, H. Case of gummous affection of the chiasma. *Virchow's Arch. f. path. Anat.*, vol. civ., 1886.

436. PRÖLSS, E. An affection of the cervical sympathetic nerve. *Inaug. Diss.*, Berlin, *C. f. A.*, vol. x., p. 320.

437. RADZISZEWSKY. Observation d'anophthalmie avec hernies bilatérales congénitales du cerveau. *Rec. d'ophth.*, 1886, p. 481, and *Progr. méd.*, Aug., 1886. Clinical diagnosis only.

438. WATSON. An intraocular gumma in a child, the subject of inherited syphilis. *Ophth. Soc. Great Brit.*, 1886, p. 56.

439. ZIEM. The dependence of some ocular diseases on affections of the pharynx. *Allg. med. Central-Ztg.*, 1886, No. 20.

BAAS (426) observed paresis of accommodation in a child aged seven after epidemic parotitis, without preceding diphtheria of the mouth or throat respectively.

BADAL (427) found 144 cases of paralysis of the muscles among his 631 observations of syphilis of the eye (*cf. Arch. d'ophth.*, vol. vi., No. 2, March–April, 1886, p. 103). The oculomotor nerve is most frequently affected, then the abducens; paresis of the oblique and facial nerves is very rare. He adds a review of those cases of paresis complicated with affections of the eye and central organs. Affections of the optic nerve are next in point of frequency; these were observed in 139 cases, or twenty-two per cent. The complications are also mentioned. Three cures illustrate the frequency of the affections of the muscles, of neuritis, and of atrophy of the optic nerve, and the time of life of their occurrence. v. MITTELSTÄDT.

HIRSCHBERG (430) diagnosticated a tumor of the right frontal lobe in a man aged twenty-one, who since birth had had numerous brown, hairy moles in the face, on the body and limbs, basing the diagnosis on binocular neuritis, left-sided hemiparesis, right-sided paralysis of the abducens, and other cerebral symptoms. The autopsy revealed a melanosarcoma the size of a hen's egg, accompanied with diffuse, blackish-brown pigmentation of the frontal side of the cerebrum and similar coloration of the inner sheath at the optic nerve. The sheaths behind the globe were dilated like ampullæ.

HIRSCHBERG (431) found that diabetes is much more frequent in the wealthier classes, as he found sugar in seventeen cases

among 1,638 examined. The most frequent disturbance is due to limitation of the power of accommodation. Brief clinical histories illustrate the complications, such as iritis, cataract, retinitis, amblyopia, atrophy of the optic nerve, and diplopia.

OPPENHEIM (435) observed in a woman aged thirty-one, who had become syphilitic through her husband, hemianopsia, with slight contraction of the nasal side of the visual field, and cerebral symptoms, vomiting, polydipsia, and polyuria. The hemianopsia disappeared temporarily, vision gradually diminished. The appearance of the fundus differed only slightly from the normal. The autopsy revealed a gumma in the central portion of the chiasma which had extended to the right side. The temporary disappearance of the hemianopsia may be explained by the great vascularity and consequent power of dilatation and contraction of the tumor.

PRÖLSS (436) describes a case of affection of the cervical sympathetic nerve which was accidentally found at Hirschberg's clinic. It affected the left side, was probably a sequence of typhoid fever, and showed the characteristic symptoms: enophthalmus, contraction of the palpebral fissure and the pupil, slight ptosis and anhydrosis, and imperfect growth of the hair on the left side of the head. Sensibility of both sides of the face normal.

WATSON (438) describes a case of intraocular gumma in a child aged six, the subject of inherited syphilis, whose right eye first presented the appearance of scrofulous keratitis. Subsequently a small hypopyon formed, then when the aqueous and cornea became clearer, a yellowish deposit was seen to occupy the pupil, and a prominence the size of a small split pea had formed on the upper and outer ciliary region of the sclerotic. This was twice punctured, and a yellow, cheesy, semi-solid substance presented in the wound. The child had a serpiginous ulcer on the thigh and chronic laryngitis, and the mother gave a history of having suffered from secondary symptoms after the birth of the child. The child was put on mercurial treatment, which was followed by marked improvement, but the eye was evidently shrinking. Watson emphasizes the following points in the case: (1) The difficulty of diagnosis in the early stage; (2) the rarity of the lesion in connection with inherited syphilis. FITZGERALD.

ZIEM (439) has often permanently cured cases of epiphora, blepharospasm, and recurrent affections of the conjunctiva and cornea, which had resisted local treatment, by the operative re-

moval of adenoid vegetations from the naso-pharynx, of hypertrophied tonsils, etc. Disturbances of circulation had probably developed in the cavernous parts of the nasal mucous membrane, and had produced a similar condition in the eye. Thus the asthenopia in chronic swelling of the tonsils may be explained by swelling in the eye, in the ciliary body. In all ocular diseases associated with affections of the naso-pharynx the whole territory of the nasal mucous membrane must be examined and treated if necessary.

REVIEWS.

A Practical Treatise on Diseases of the Eye. By Dr. ÉDUARD MEYER. Translated from the third French edition, with the assistance of the author, by FREELAND FERGUS, M.B. Philadelphia: P. Blakiston, Son, & Co., 1887. Pp. 647. Price, cloth, $4.50.

A work that has gone through three French and four German editions, has been translated into Italian, Spanish, Polish, Russian, and Japanese, may well bid defiance to the critic, should any one be so bold as to assume that rôle. This is the fortunate condition of Dr. Meyer's treatise, the English translation of which is before us. The cause of its popularity is not far to seek. It is clear, concise, conservative, and eminently — as its title indicates — "practical." If we have any fault to find with the work it is that it has not enough of theory; that fundamental principles are not set forth with sufficient fulness in some instances for a satisfactory appreciation of the practical aphorisms, and that its conservatism is carried to such a degree as to fall, in some instances, behind the spirit of the times. In speaking of the operation of cataract-extraction, for instance, a full and quite detailed account is given of the old flap method, which is practised by few, if any, prominent operators, while the operation without an iridectomy, as practised by nearly all the French surgeons and rapidly coming to the fore in this country, is dismissed with a single short paragraph. In mentioning the method he says: "Doubtless our progress in the knowledge of antiseptics, local anæsthesia, and myotics warrants and explains these attempts; and the general adoption will depend upon the benefits arising from them rather than upon the attacks now directed against extraction with iridectomy, which has been advocated for the last twenty years and supported by numerous favorable statistics" (p.

383). Antisepsis is not considered with the fulness the present interest in the subject demands.

The specialist will note, among other points of interest, that the author recognizes the existence of "amblyopia exanopsia"; that jequirity is not more than mentioned, and sclerotomy is treated coldly; that, though "skiascopy" is spoken of, the name of Cuignet, its discoverer, is nowhere to be found, but in its stead those of Parent and Chibret.

The chapter on the muscles of the eye, with the physiology and pathology of its movements, is of exceeding excellence, and for the student is the best we know of anywhere.

We have not the least doubt that, in spite of the few shortcomings (as they appear to us) above noted, the work will find, in its English dress, the same popularity, as a text-book, which has been accorded to it in other countries and other tongues.

S. M. B.

SWAN M. BURNETT: **A Theoretical and Practical Treatise on Astigmatism.** With fifty-nine diagrams and illustrations. J. H. Chambers & Co., St. Louis, Mo. Price $3.50. Reviewed by H. Knapp.

Dr. Burnett has united in a monograph of 245 pages all that is essential to a thorough understanding of the principles of astigmatism and the successful management of patients suffering from this most important anomaly of refraction. Presupposing no special knowledge on the part of his readers, he describes in the first chapter the elementary phenomena of refraction. The second chapter enters into the dioptrics of asymmetrical bodies, in which the author, in conjunction with Prof. Harkness, has made original investigations, chiefly on the refraction of rays impinging at some distance from the axis of the system. The refraction at the sharper and blunter ends of an ellipse, of bi-axial and tri-axial ellipsoids, the focal lines and planes, etc., are critically reviewed, in an elementary way.

If the author says, page 29: "The circular section of the focal interval will not be found in the [his] figure as is represented in all the figures that I have seen, except those given by Mauthner, and as it is actually described as being by several [for instance, by Donders] in the middle of the focal interval, but always nearer to the anterior focal plane," the reviewer begs leave to remark that he, in a paper in vol. viii., part 2, of *Graefe's Archives*, p. 205, etc., 1862, determined the length of the focal interval, the length of the

focal lines, the position and the radius of the circular section of the focal interval both mathematically and experimentally. The demonstrations of Mauthner,[1] 1876, and Burnett, as far as they go, are the same as those of the reviewer.

The third chapter treats of the astigmatism of the human eye, the history of the astigmatism of the cornea, the different forms of ametropia, and the varieties of astigmatism. The fourth, fifth, and sixth chapters are on the subjective diagnosis of astigmatism, describing the different methods and tests in a clear and practical way, pointing out their advantages, as well as their inconveniences and fallacies.

The seventh chapter gives an excellent exposition of the ophthalmoscopic diagnosis of astigmatism, by the direct and indirect methods, with diagrams and wood-engravings illustrating the instruments, their use, and the appearances of the fundus of astigmatic eyes.

The eighth chapter very clearly describes the shadow-test (skiascopy, pupilloscopy, etc.). The author expresses his standpoint on this question as follows, p. 120: "When one becomes skilful in the use of this method, an approximation to within 1 D of the optical state of the eye can be made in the majority of cases. For its most satisfactory employment a wide pupil is essential, and it is necessary that the eye examined shall be protected thoroughly from all light except that which comes from the mirror.

"Like most of the other methods of objective examination, it requires much practice to become expert in its use, and is, according to my experience, more consumptive of time than the ordinary ophthalmoscopic methods."

The ninth chapter, keratometry and keratoscopy, does justice to the ophthalmometer of Javal and Schiötz, "which, in my estimation, must be regarded as the most important, practical, and exact means of diagnosis given to our science since the invention of the ophthalmoscope." The instrument and its use, with a table showing results of the author's own measurements, are described [more fully in his paper, in vol. xiv., p. 169 of these ARCHIVES], as well as the keratoscopes of Pacido and De Wecker.

The symptoms and causes of astigmatism are the subjects of chapters ten and eleven. Asthenopia and the nervous symptoms

[1] "Opt. Fehler der Auges," p. 711.

due to eye-strain are briefly but forcibly stated. The correction of astigmatism (chap. twelve), a goodly part of the daily work of the ophthalmic practitioner, contains excellent hints, but might, we think, have been more elaborately treated, giving, in systematic order, the management of the numerous varieties of simple and compound astigmatism, in young and old people, and for different occupations. If, however, the reader supplements this chapter by the expositions contained in previous parts, more especially in chapter four, he will find all he needs.

The work concludes with a chapter on irregular astigmatism and conical cornea, and an appendix, a statistical record of 806 astigmatic eyes, examined by the author, in 36 % of which V was raised to $\frac{20}{20}$.

The book is well written, handsomely printed, largely illustrated by almost exclusively original drawings, and, in our opinion, fully equal to its purpose to furnish the student and practitioner a sure and complete guide in his study of theoretical and practical astigmatism. To the expert, the collection of the material and the extensive bibliography will be of great interest and profit.

MISCELLANEOUS.

The oculist, Dr. LOUIS JANY, died Dec. 9, 1886, at Breslau, in his fifty-fourth year. He was the author of numerous papers, some of which were published in these ARCHIVES.

Privat-Docent Dr. HELFREICH, of Würzburg, has been appointed honorary Professor of that University.

Prof. SCHNABEL, of Innsbruck, has been appointed to the Professorship of Ophthalmology at Graz vacated by Prof. Dr. BLODIG.

Dr. BORYSIEKIEWICZ, Privat-Docent, has been appointed Professor of Ophthalmology at the University of Innsbruck, Tyrol, to succeed Professor SCHNABEL.

Dr. GEO. S. NORTON has been appointed to succeed the late Prof. LIEBOLD in the Chair of Ophthalmology at the N. Y. Homœopathic Medical College.

Prof. B. F. FRYER has resigned the Chair of Ophthalmology and Otology in the Kansas City Med. College.

Prof. Dr. JOHANN FRIEDRICH HORNER, one of the most emi-

nent scientists and teachers of ophthalmology, died Dec. 21, 1886, at Zurich, his native city. He was born March 21, 1831, and received his early education at the Zurich "Gymnasium," which he left in 1849, and then began to study medicine at the University. He was especially attracted by the lectures of the physiologist, Ludwig, and the clinicist, Hasse. After passing his examination he went to Berlin, where he became acquainted with Albrecht v. Graefe, through whose influence he was induced to devote himself exclusively to the study of ophthalmology. For two years, 1854 and 1855, he was his assistant, and ever afterwards remained a close friend of his teacher. After devoting some time to study at Paris and London he established himself in 1856 at the University of Zurich as "Docent" of ophthalmology and began to practice as an oculist. He rapidly obtained a large practice and his fame soon spread beyond the narrow confines of his native country. In 1862 Horner was made Professor Ordinarius and was placed in charge of a ward for eye-patients in the hospital of the canton. In 1884 the first symptoms of heart and kidney-disease manifested themselves, and in the fall of 1885 forced him to retire from his professorship. In the spring of 1886 his condition improved, so that he could again attend to a part of his practice. On Dec. 17th he had a stroke of apoplexy, and died on the 21st.

Horner did not do as much literary work as might be supposed. His most important publications appeared in dissertations of his scholars; others can be found in *Zehender's klin. Monatsblätter für Augenheilkunde*, and in the *Correspondenzblatt für Schweizer Aerzte*. His most important publication was "The Diseases of the Eye in Childhood" ("Handbuch der Kinderheilkunde," Gerhardt, Tübingen, 1879). His great skill as a successful operator of cataract and his researches on the antiseptic treatment of wounds were well known; he discovered the rhachitic form of the teeth in zonular cataract, and the mycotic origin of corneal ulcers. Many prominent oculists have been his assistants, among others MICHEL (Würzburg), LANDOLT (Paris), HAAB (Zurich), KNIES (Freiburg), SCHÖN (Leipzig).